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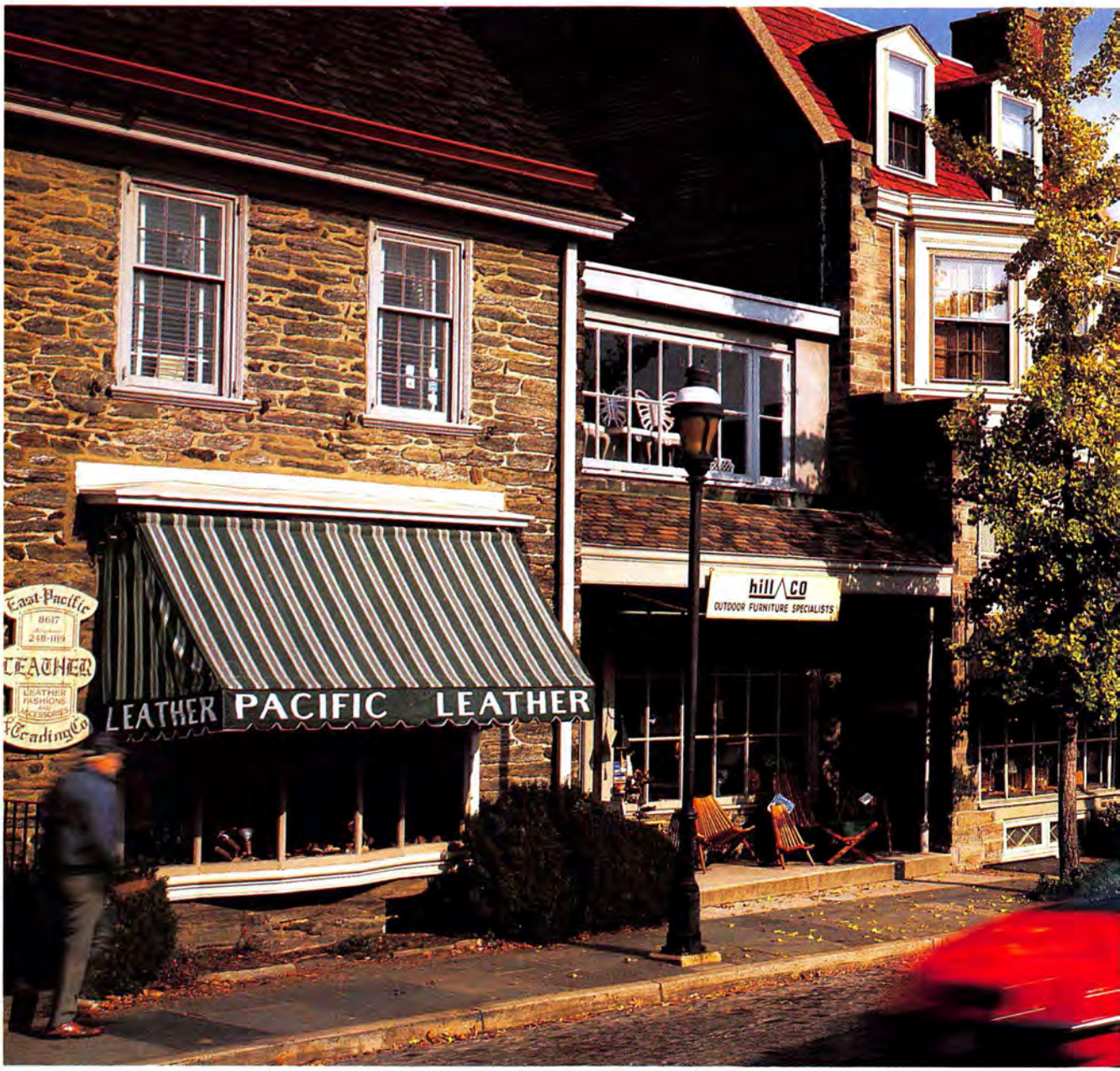
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MacUser

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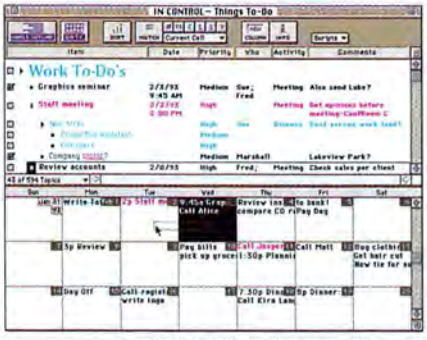
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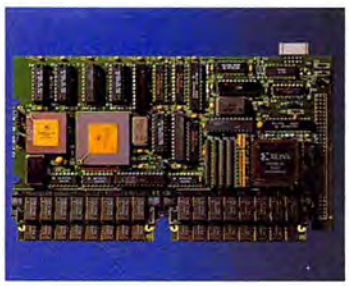




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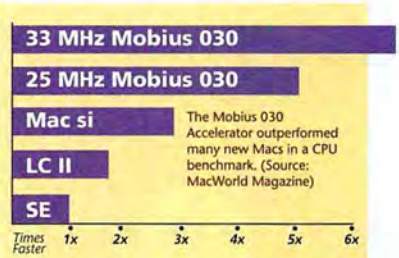
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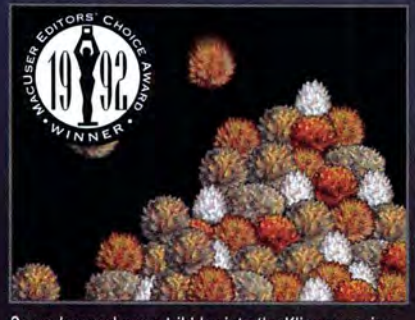
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About

MacUser

The Electronic Magazine

There are at least 300,000 of you who don't know about ZiffNet/Mac, *MacUser*'s eclectic electronic supplement to the magazine. We're going to correct that.

Launched in May 1990, ZiffNet/Mac is a CompuServe-hosted on-line service specially set aside for readers of *MacUser* and *MacWEEK* and is the brainchild of Ben Templin (electronic address 72511,35), a former *MacUser* editor and now executive editor of ZiffNet/Mac. Over the past three years, Ben's mission has been to explore the electronic frontier, aided by his loyal cyberspace companions, project leader Shef Syed (72511,75) and associate editor Mark Simmons (72511,256).



ZiffNet/Mac's Mark Simmons works on cultural icon Bill Gates.

You can meet Ben, Shef, and Mark electronically on ZiffNet/Mac's Download & Support Forum, where "no query goes unanswered," says Mark. Shef commissions and oversees production of the free monthly *MacUser* utility, and Mark picks and posts the Top Ten *MacWEEK* news stories of the week. Mark is also ZiffNet/Mac's unofficial iconographer: He creates the icon for each *MacUser* utility, and he designed one of *MacUser*'s most popular utilities, the Custom Icon Pack, a set of icons to help dress up your desktop. But by helping design this month's free utility, a screen saver called Bill Gates Does Windows, Mark may have created his masterpiece.

Bill Gates Does Windows shows Microsoft founder and window washer Bill Gates scrubbing away at the rapidly accumulating crud on your screen. As you'll read on page 256, simply by adjusting the control panel, you can make the richest person in America really sweat for you.

The free utility of the month is just the tip of the cyberg, however. "ZiffNet/Mac offers more in content, and more in innovative content, than any other on-line service," says Mark. "Its staff is also more knowledgeable — and more humble."

Among that content is the MiniFinders database, comprising 1,500 minireviews of Mac hardware and software products, and the MacUser Index. The Download & Support Forum gives you access to more than 1,000 shareware and freeware files, including all the *MacUser* exclusive utilities. And then there's the Executives Online Forum, a real-time conference with Mac-software and -hardware luminaries.

ZiffNet/Mac is trying to push the electronic-publishing envelope in other ways too. "We try to do things that can't be done on the printed page," says Ben. "For example, our expert stacks [available in the Download & Support Forum] offer an interactive way to make a purchasing decision. We're also experimenting with QuickTime movies that demonstrate how programs work. We've got one that shows how to create a morph with VideoFusion and another that demonstrates how to create a database in FileMaker Pro."

— Nancy Groth



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Apple an a higher standard

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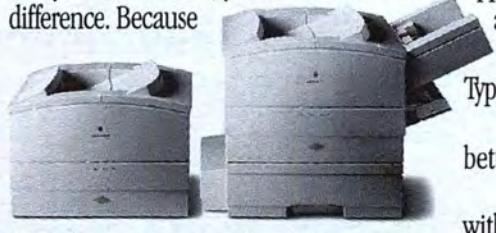
The LaserWriter Pro 600 and 630 feature PhotoGrade, an Apple breakthrough allowing you to print up to 91 levels of gray – that's 35% more grays than with our award-winning LaserWriter IIg.

Both models incorporate an Apple breakthrough in gray-scale printing called PhotoGrade.™ A process that intelligently adjusts the size and position of every dot in relation to neighboring dots, allowing you to print up to 91 levels of gray at 300 dpi.

That's equivalent to a 1,000-dpi printer costing mountains more.

The result is noticeably sharper details and the ability to reproduce the subtle tones of gray in black-and-white photographs.

But even when you don't integrate photos into your documents, you'll still notice the difference. Because Apple's FinePrint™ technology gives your text and line art cleaner edges and smoother curves. So your TrueType™ and PostScript™ Type One fonts have never had more impact.



Both LaserWriter Pro models come with two paper trays and a host of paper-handling options, including a 500-sheet feeder and a 75-envelope feeder.

Any way you look at it, your work looks better coming out of a LaserWriter Pro.

Two paper trays come standard, along with an array of options including a 500-sheet feeder and a 75-envelope feeder for a total paper-handling capacity of 850 sheets.



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nounces of laser printing.



able to move even the largest, most complicated image files and print them at speeds rivaling any RISC-based printer.

And if you happen to work in a mixed environment, both LaserWriter Pro models fit right in. They support PCL page description language and can easily accept jobs from Macintosh® and Windows-equipped computers simultaneously.

They also provide you with something that no other printer in the world can: Apple's renowned plug-and-play simplicity.

LaserWriter Pro 630 vs. HP LaserJet 4M		
Price:	$2,529†	$2,999†
Gray levels:	91	51
Macintosh fonts:	64 TrueType 35 PostScript	None 35 PostScript
PPM:	8	8
Ethernet:	Built in	Optional
RAM:	8MB	6MB

You can also select and switch paper trays right from your computer and print a letter, complete with second sheet and envelope, without ever leaving your desk.

No other printer in the industry allows you to do so much so easily for so little.

For high-performance networks, the 630 features built-in Ethernet. So you'll be

In fact, Apple® LaserWriter printers were recently ranked highest in Overall Laser Printer Customer Satisfaction by J.D. Power and Associates.* Outranking Hewlett-Packard.

To see why, visit your authorized Apple reseller for a full demonstration.

You'll find that the LaserWriter Pro has the power to elevate your work to a level ordinary printers can only aspire to.

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The new LaserWriter Pro series from Apple.

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LETTERS



Photographer Marc D. Longwood, of Gold River, California, warns readers that computer companies often use design contests to lure unsuspecting amateurs into creating materials that later may be used for corporate marketing purposes — without payment.
"It's one thing to identify specific usages as a condition of the winners' receiving prizes as due compensation but another to dupe all entrants into giving something away for merely a chance at a prize."
You've got a point, Marc. That's the reason why, here at Letters to the Editor, we don't dangle expensive prizes to entice readers to enter our little epistolary contest. (After all, what more could anybody want than their name in *MacUser*?)



Write to Letters to the Editor, c/o *MacUser*, 950 Tower Lane, 18th Floor, Foster City, CA 94404, or post your letter on the MacUser Forum of ZiffNet/Mac, our on-line service.



All letters become the property of *MacUser*, and we reserve the right to edit any letters we print. Please include a return address and a daytime phone number.

License to Unwrap

The central evil of shrink-wrap licensing as described by Michael Swaine ("Taking License," January '93, page 41) isn't the particular provisions of the licenses but the very concept. A shrink-wrap license amounts to setting the terms of an agreement *after* it's been executed and the goods have been delivered. When a company tries to tell me that by opening a package, I'm assenting to an agreement it presents to me after it has received my check, that company plummets in my estimation. On the other hand, a company that recognizes that its protection is copyright law and deals fairly with its customers gains my admiration.

Gary McGath
Penacook, NH

Michael Swaine's column "Taking License" contained certain errors and omissions that could leave readers with the wrong impression of the rights afforded them by the copyright law.

Swaine correctly notes that the law is strict but states that it "prohibits even necessary copying," such as that required to load the program into memory. In fact, the law recognizes the need to load software into a computer's memory in order to use it and specifically grants that right.

Furthermore, Swaine states that "copyright law doesn't allow you to make any copies of the software you purchase." Actually, it expressly lets you make one (and only one) copy for archival purposes. This is probably why "software companies are almost unanimous in allowing only one backup copy of a program." They can choose to allow more, but they cannot permit fewer.

As an aside, let me mention that shrink-wrap-licensing agreements have yet to be adequately tested in the courts, and it is likely that many of their restrictive provisions are unenforceable.

Kemal Tekinay
New York, NY

I stand corrected on current copyright law. As for the legal status of shrink-wrap license agreements, it's true that it has yet to be fully tested in the courts. That's why I think it would be prudent to assume that the provisions of these agreements can be enforced until the courts say unequivocally otherwise, or better yet, until software companies stop

Dear Mr. Sculley . . .

In January we asked, **What companies should Apple form alliances with, and why?** Although we expected to receive slightly silly answers such as McDonald's (for that Big Mac Attack), Mr. Sculley should take notice of these thoughtful replies.

"Two companies come to mind," writes Paul Osborne, of Sacramento. "Both are giants in their field, respected by professionals that swear by their products, and have been in the same business for a minimum of 20 years: Nikon, photographic and optical master; and Grass Valley Group, television-production-equipment manufacturer." Paul believes that the two companies — no strangers to setting standards — can capitalize on the Mac's ease of use and flexibility to create innovative consumer-oriented equipment. "By revolutionizing the world of consumer electronics with Mac-based products, Apple could make the world a cooler place in which to live." The CIA might be interested in a Newton-based scanner/video camera, don't you think?

Ken Nelson, of Fremont, California, thinks Apple should join forces with a telecommunications company to push through a CCITT standard for digital telephone systems. "I see a particular need for a visual front end for call routing and voice-mail. Current systems are sort of an audio DOS — useful but painfully slow and finicky. Of course, the phone would multiplex data with voice without a loss of audio quality and would work transparently with a regular phone."

Nancy Morrison, of Portland, Oregon, offers this potential partner for Apple: "Disney. Really. Think about it. The notion of a Disney/Apple theme park is intriguing enough (talking trash cans welcome you to "GUI-land"), but consider the opportunities in multimedia and animation." That day may be closer than you think, Nancy. All together now: "It's a world of icons, a world of mice, / It's a world where the interface is awful nice. / When there're files to be shared and we're 7-aware, / It's a Mac world after all"

Forming such alliances would be one way for Apple to keep the competition at bay, but there must be other methods besides lobbing rotten fruit at certain companies' corporate headquarters.

Speak Up:

What should Apple do to keep its competitive edge over Microsoft and its Windows?

Send your thoughts to Dear Mr. Sculley, c/o MacUser, *950 Tower Lane, 18th Floor, Foster City, CA 94404.*

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LETTERS

using the things, which I believe will happen this year if 100,000 letters respectfully requesting an end to shrink-wrap licenses suddenly appear at the offices of the Software Publishers Association, 1730 M Street, N.W., Suite 700, Washington, DC 20036. I suggest we all write today and put an end to this nonsense. — MS

Detention for Ihnatko

As a student, I was deeply offended by Andy Ihnatko's article in the January issue of *MacUser* ("Where to Buy a Mac," page 29). His advice to take advantage of the educational discount Apple offers is wrong. If people do this, the educational discount will disappear and many deserving educators and students will be without computers. I would suggest that you keep a close eye on Ihnatko's columns in the future so that things like this do not happen again.

Jason Hahn
via ZiffNet/Mac

Andy Ihnatko should be required to sit in the corner and write on the board 100 times: "I will not encourage unauthorized individuals to apply for educational discounts, thus jeopardizing the program for genuine students and educators."

Barbara S. Andrews
Toledo, OH

Well, I went with it chiefly because: (a) it was more interesting than just saying, "Want an educational discount? Become a student!" and (b) of about a dozen colleges in the Boston area, this ruse would work with only one of 'em. Nonetheless, my apologies to anyone offended. — AI

Freedom of Press

There are several points I'd like to clarify regarding our product Freedom of Press, mentioned in "Breaking the Print Taboos" (January '93, page 223).

The author says that PostScript-language cartridges and, by extension, software interpreters are not for high-end publishing. On the contrary, there are three versions of Freedom of Press: Light ($149), Standard ($299), and Pro ($1,495+). The Pro version is designed for high-end desktop publishing, in that it features eight-level anti-aliasing and ColorVantage automatic color correction and supports high-end output devices.

The article further states, "You can also use PostScript-emulation software, such as Freedom of Press . . . , but only if you're not in a hurry. The translation is mind-numbingly slow." Freedom of Press is as fast as any other software interpreter on the market today. As with any application, the speed is dependent on the speed of the machine. PC users often complain about the slowness of the Mac, and we all know how many satisfied Mac users there are! For those who want the very best quality from non-PostScript printers, there is no better price/performance choice than the award-winning Freedom of Press family.

Carol Vitagliano
Director of Marketing
ColorAge, Inc.
Billerica, MA

I did not mean to imply that Freedom of Press was slower than any other software PostScript interpreter — software emulation is always slower than hardware emulation. As for PC users, although DOS users have valid complaints about the slowness of the Mac, Windows users are still working with a slower system than Mac users are. — JR

Imperial Advantage

The Computer Care BookView Imperial board the *MacUser* lab staff evaluated in "Breaking Out to the Big Screen: PowerBook and SCSI Display Adapters" (December '92, page 172) was an early release, and many improvements have been made since, including System 7 compatibility and a new plastic housing to secure video-out connectors to the PowerBook case. Also, because our customers praise our excellent service, I was surprised to read that your staff did not receive prompt technical support when they called Computer Care.

I disagree with the author's suggestion that due to the BookView Imperial's price, users might do better to sell their first-generation PowerBook and buy a PowerBook 160 or 180. First, the cost of the BookView Imperial includes its 6 megabytes of RAM plus the video circuitry provided for superior monitor support. Second, the BookView Imperial's support for 16- and 19-inch monitors in full 8-bit color and soon-to-come NTSC support are features not offered by the new-generation PowerBooks 160 or 180 — or any other product in the review, for that matter. (The highest resolution supported by the new PowerBooks is for 16-inch monitors.) A PowerBook 140, 145, or 170 with a BookView Imperial card

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LETTERS

can surpass the built-in features of the PowerBook 160 or 180.

Mary Depew
General Manager
Computer Care, Inc.
Minneapolis, MN

Sticky Wicket

In the January '93 Tip Sheet (page 255), Philip Russell had his jargon mixed up. What he called a "soft return" is known as a "sticky space." You create a soft return by pressing Shift-Return (not Option-space) and use it most often when you want to break to a new line without ending the current paragraph.

Doug Hughes
San Jose, CA

I was a bit soft-headed to call a hard space — which you call a sticky space — a soft return. I am now typing 100 lines of text, each with a hard space at its end, to repent. — PR

Blueridge Maintains

The document-management article "Pushing Beyond Paper" (January '93, page 215) did not mention Blueridge Technologies. Blueridge has more installations of Mac-based document-management systems than anyone else in the world and has been in the business for five years.

For two years, Blueridge has been shipping Optix Network, a document-management system, with a UNIX-based Mac server that runs a SQL database serving Mac clients. The performance actually exceeds the performance of the systems based on Sun and VAX servers that you mention later in your article.

Otherwise, the article was one of the best pieces on document management I have seen in a computer publication.

Keith Ellis
Vice President, Sales and Marketing
Blueridge Technologies, Inc.
Flint Hill, VA

We apologize for the oversight. Blueridge can be reached at 703-675-3015. — KO

Slots Machine

After agonizing over which Mac to buy, I finally settled on a IIvx and am anxiously awaiting its arrival. But when I read Russell Ito's review ("The Multimedia Mac: The Macintosh IIvx," December '92, page 126), I became concerned that maybe my choice was not the wisest one.

The article raised several questions, of which the most perplexing was whether or not the IIvx really can drive a 16-inch color monitor at 8 bits without the addition of a video card. Because I've already ordered a IIvx and a 16-inch monitor with an 8-bit video card, I'd like to have this question resolved. Should I send the card back or keep it?

Susan Burroughs
North Pole, AK

Due to miscommunication with Apple, we misstated the Mac IIvx's monitor support. The Mac IIvx does require a separate video card to drive 16-inch monitors. Its built-in video supports monitors only as large as 14 inches. Sorry for the confusion. — RI

RAM-a-Lam-a-Ding-Dong

Contrary to what's implied in "Maximum RAM" (January '93, page 90), users of SE/30s who install more than 8 megabytes of RAM and System 7.1 need to get MODE32 from somewhere, because it's not in System 7.1. Why isn't MODE32 included?

Jay Kangel
Minneapolis, MN

The article does include SE/30s in its list of Macs that require MODE32 to access 32-bit addressing under all flavors of System 7 (page 93). But you're right; you do have to get it from somewhere, because Apple has decided not to include MODE32 with System 7.1. Connectix's MODE32 is available free from dealers, user groups, and on-line services. — PP

In the article "Maximum RAM," you showed in Table 1 that in the Mac Plus and the SE, the possible RAM configurations were 1, 2, 4, and 5 megabytes. As far as I know, that's incorrect. The possible configurations are 1, 2, 2.5, and 4 megabytes.

Andy Ringsmuth
Grade 8
Lincoln, NE

We were testing you . . . yeah, that's right. We were checking to see how smart eighth-graders are. Congratulations, kid, you passed. — PP

Buyer's Guide Remorse

I loved *The MacUser 1500* (1993 special issue), but gee whiz, I'd really love to see "The Complete Trail Map to Older-Mac Upgrade Paths" — kinda like a compiled version of the "Workshop" articles

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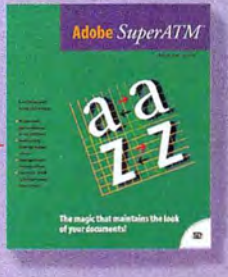
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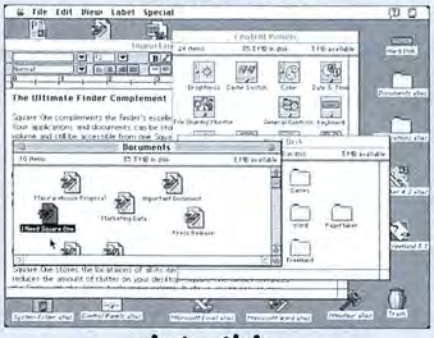
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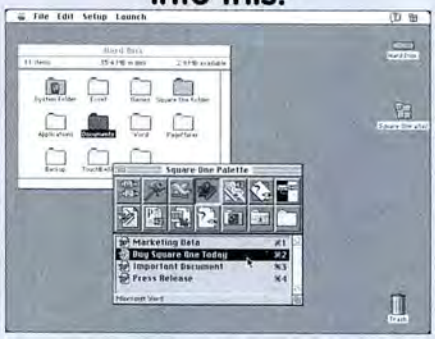
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LETTERS

you've been doing. These are very useful for those of us who feel morally obligated to (at least attempt to) buck the cutting-edge "gotta-have-the-latest-Mac-I-can-get-my-hands-on" craze! There's still a lotta bang in those now discontinued machines, and as a guy who's exploring the upgrade jungle (LC to something faster, better, able to leap tall buildings, you know . . .), I'd love to see it all in one place!

John Hadden
via ZiffNet/Mac

Your *MacUser 1500* special issue arrived yesterday, and I quickly turned to the "how-to-buy" coverage for the CD-ROM drive I've been lusting after. Because I'm interested in Photo CD, I began leapfrogging through the MiniFinders section on Storage Systems/Removables (couldn't you have subdivided the section by categories?) to look for multisession-capable drives as you had advised. But I couldn't find a single listing that mentioned multisession capability. Was this feature omitted from some of your listings? I hope you're not trying to tell me I have to buy a CD-ROM drive encased in a Performa 600 or a IIvx; surely someone makes a stand-alone drive with such a feature, please, don't they?

Arden A. Cambre
Flint, TX

By now, you've seen both the March '93 issue, in which we checked out 23 CD-ROM drives, and this issue, which has a lab report on 100 acceleration systems for aging Macs. To provide a comprehensive upgrade overview in one package would be tough, because the number of upgrade options is staggering. That's why we provide the information in smaller chunks in each issue. As for multisession CD-ROM drives, they're just reaching the market (see the March story's "On the Horizon" sidebar), so we didn't have a chance to review them for the special issue. — PP

Reality Check

Regarding Jon Zilber's extremely effervescent January '93 column ("Geniuses at Work," page 23): Jon, calm down. Enthusiasm for Mac products should be used to aggressively market what is already a fantastic computer, not to deny reality.

To wit: You're right that it's high time someone developed a notebook that plugs in to a home machine. But until the PowerBook Duos 210 and 230 are redesigned to add an internal floppy drive (essential for notebook users on the road), the systems are less than perfect. As for keeping an entire electronic library in a PowerBook, I'll agree when Apple designs a notebook that has a CD-ROM drive built in.

And if the "Jimi Hendrix strategy" mentioned by Quark's Fred Ebrahimi is that good, why is GM Europe rolling in cash while GM America has just fired 14,000 more workers? I'm glad it worked for Quark, but it's not universal. Success in one market never guarantees success in another.

Jonathan Frater
Forest Hills, NY

Clarifications

In "The MacUser UltraBook" (February '93, page 159), the PaletteBook color display was wrongly identified in the caption on page 163. It's from Newer Technology (800-678-3726).

In the review of Special Delivery (January '93, page 76), the address for Interactive Media should have been Interactive Media Corp., P.O. Box 0089, Los Altos, CA 94023.

In the "Bargain Color" sidebar to "Setting the New Standard: 16-Inch Color Monitors" (January '93, page 104), the name and price range of Lapis Technologies' product family are incorrect. The ProColorServer line consists of four families of cards compatible with the SE/30, the LC family, the II family, and the Performas 400 and 600. Available for 17-inch displays in 8-, 16-, and 24-bit models, the boards cost from $399 to $699. For more information, call 510-748-1600.

In "High-Resolution Printers" (January '93, page 186), the price of Xante's Accel-a-Writer 800 was incorrect. The correct price is $3,295.

In the February '93 review of PowerBook and SCSI Display Adapters, the mouse ratings were omitted due to a printing error. The Mirror PowerVision and ViewPort got ↕↕↕↕ and ↕↕↕½, respectively. The Lapis Technologies Power Base I received ↕↕↕½. The LifeTime Memory Products Video+ PB140/170 and the Aura Systems ScuzzyView each got ↕↕↕.

"The MacUser 100" (December '92, page 93) and "The MacUser 1500" (1993 special issue, page 243) should have stated that Sun Clock 3.0 can actually create readouts for more than one time zone, not just one.

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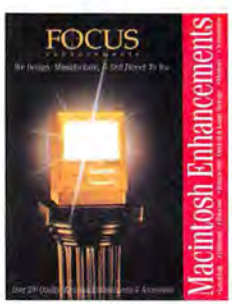
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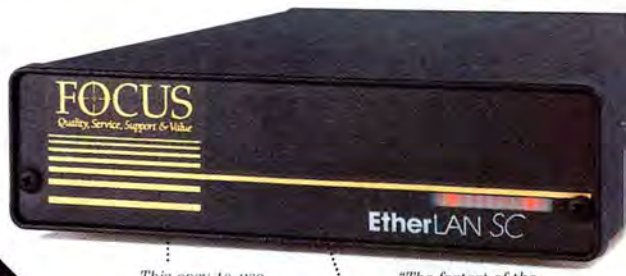
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CIRCLE 81 ON READER SERVICE CARD.

JON ZILBER

Letter Rip



With IBM posting a loss of $5 billion for 1992, everyone else is getting a bit nervous. Here's an inside look at how the movers and shakers plan to revitalize the computer industry.

A package appeared in my mailbox the other day, along with a note that read, "The enclosed letters were undeliverable. Based on the subject matter, we think they may have been intended for you or your readers. Regards, The U.S. Postal Service." As a public service, those letters are reprinted here:

Dear Members of the Board,

Missing something? Five billion bucks, to be precise? I guess they won't be calling you Big Blue anymore — it's more like Big Red, as in Red Ink!

Maybe I can help. Enclosed is a PowerBook for your erstwhile chairman, Mr. John Akers — on the house. I've taken the liberty of installing a copy of Quicken, so he can learn how to balance a budget, along with a résumé package.

But really Five billion dollars? Five billion? Five? If I wanted to toss five thousand million simoleons down the flusher, I'd have more to show for it than a motley assortment of aging mainframes, a bunch of me-too PCs, a mixed bag of peripherals, and a lackluster commitment to your one real asset: OS/2.

Five billion? That's a dollar for every human being on the planet. That's $158.55 *every second* (OK, 1992 was a leap year, so it was only $158.12 a second). Tick-tock-tick-tock. Oops, there goes another thousand bucks. Sheeesh You guys dropped almost $10K for every PowerBook we sold last year. Just reading this paragraph cost you a couple of Quadra 950s.

If you're interested in changing things, you know where to find me.

Regards,
John Sculley

Dear John,

Word on the street is they're trying to get you to take over for Akers at IBM. If I were you, I'd go for it. Hey, what else *can* you do? I learned the hard way: When you've been responsible for *the* success story of the century, everything else is anticlimactic.

The toughest part of such staggering success is figuring out an exit strategy that plays well in the annals of corporate history. When you've peddled Pepsi, PowerBooks, and PDAs, everything else seems kind of lame.

But trust me, John: The glory days aren't going to last forever. Get out while you're ahead. Heck, without those PowerBooks, you'd be facing the same fate as John Akers. Speaking of whom, I don't know who's spreading them, but some of those jokes are really cruel. Have you heard this one yet?

Q. How much dirt does it take to bury IBM?

A. Oh, about an Aker.

Well, maybe you could go into public service instead — nice work at Clinton's economic summit, by the way.

Don't be a stranger,
Steve

Dear John,

Thanks for stopping by for my economic summit. Let's do it again sometime.

You wouldn't believe what a mess this place is. Nobody knows the first thing about computers or high-tech communications gizmos. I asked a secretary from the White House steno pool to duplicate a floppy for me and he came back with a photocopy of it.

Well, I guess it's what I should have expected to inherit from an administration that had never even seen a grocery checkout scanner. Forget the economy — it's the fax machine, stupid.

John, we really could use a White House information czar. I do enough jogging without having to personally operate the White House sneakernet.

Presidentially,
Bill

Dear Mr. Sculley,

Thank you for your letter regarding employment options at IBM. Although we do not currently have any vacancies, we have placed your résumé on file and will let you know if we have any openings that suit your qualifications. We have also enclosed a compilation of Akers jokes, per your request.

Thank you again for your interest in International Business Machines.

With best wishes,
IBM Human Resources Dept.

P.S. By the way, all those fancy fonts were pretty neat! What kind of computer did you use for that?

Dear Bill,

I hope you're enjoying the PowerBooks. The 180 was for you; the 100 was for Al. (I'd be happy to send an extra mouse for Socks.)

I've given some thought to your proposal,



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and I think we may be able to do business. After we get the White House running on Ethernet, we'll get you set up with E-mail. E-mail is really neat: You can send QuickTime videos of Chelsea to your whole cabinet, all at once. And it's a lot easier to delete messages than it is with those tape recorders left over from you-know-who.

Listen, you've got to do something about IBM. You probably heard that they managed to lose $5 billion last year. That's a lot of Big Macs, Bill.

This might be hard to believe, coming from me, but IBM's vitality is important for this country. We'll have to help them out so this doesn't turn into another Lockheed. Here's what we do: The government floats them a loan at attractive terms. Overnight, IBM becomes a prime candidate for a leveraged buyout. I know an outfit in Cupertino that might be interested in helping them out (wink, wink). We'll make IBM a division of Apple and install Tipper as an executive vice president. That'll keep her so busy that she'll stop making such a fuss about rock-music lyrics. (I think that's why Arsenio hasn't invited you back.)

I've got a couple of other appointments in mind. We'll send a Quadra and Excel to crazy ol' Ross. He can be your Minister of Infographics. With all those charts to play with, he'll stay out of your hair for months.

That was a good one about IBM: "About an Aker"!! Ha ha! But have you heard this one:

Q. What's the difference between IBM and Wang?

A. Oh, about two months.

Seriously, though, this IBM thing really has the whole industry shaken up. Companies that have been coasting for years are finally getting serious about warming up to their customers. What with the tight job market, even Gates and Kahn are getting nervous.

How about stopping by Silicon Valley to share some tips on how to turn so-so products into a market phenomenon in tough economic times? I understand your campaign manager is an expert at that.

Regards,
John

Dear Microsoft Word owner,

Sure, we sell a ton of copies of Windows. But we really do love our Mac-application business. I'd like to personally thank each and every one of you and hear what's on your minds. This July 4, I'll be throwing a little barbecue up at the house for all 7 million of you. So stop on by. I'll be the one in the "For this I dropped out of Harvard?!?" apron.

Bill "BBQ-meister" Gates

Dear Mac user,

You don't know me, but I'm really an important guy in the software business. Honest. I head up a company called Borland. We sell development tools and application software.

A while ago, we bought up a company called Ashton-Tate. They used to make a little database program called dBASE. There was, briefly, a Mac version of dBASE, but I don't want to stir up any bad memories. The thing is, we got stuck with a bunch of neat Mac applications such as FullWrite and Full Impact.

We're very sorry that we haven't been giving our users much in the way of tech support or upgrades. We realize that we should have either sold off these products to a developer who would support them or made a commitment ourselves to keep them alive. To make things right, we've decided to give all registered owners the chance to trade in their old software for comparable packages from our good friends at Symantec and Microsoft.

Vive le Macintosh,
Philippe Kahn

Dear Macintosh owners,

We here at Apple appreciate your continued support. You may have heard that we recently introduced a new Mac with greater performance than the machine you bought 60 days ago, for $500 less than you paid.

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Funny thing about those letters: They were all dated April 1.



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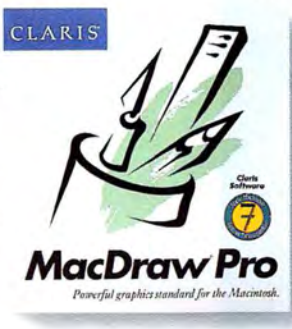
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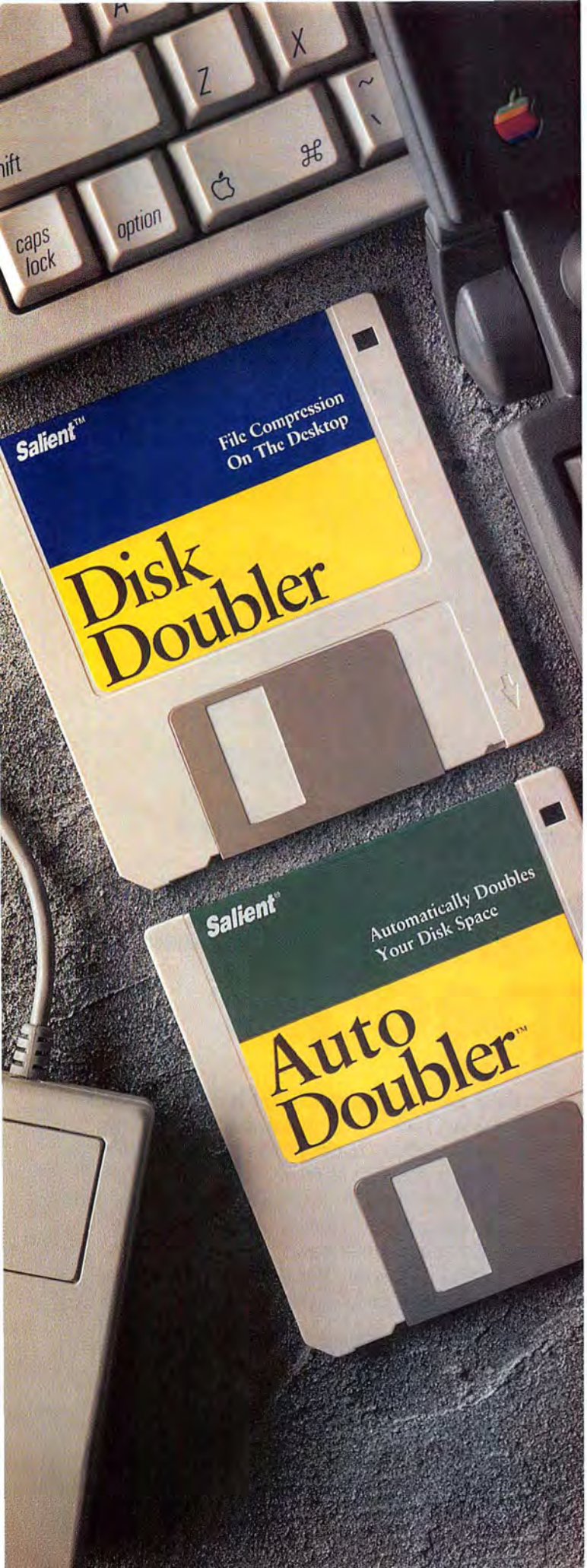
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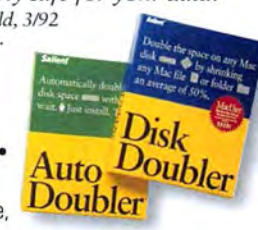
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CIRCLE 124 ON READER SERVICE CARD.

ANDY IHNATKO

Out of Orders



Ever had an ordered product delayed? Lost in the mail? One company's problems offer some interesting lessons for consumers.

When, soon after this column's debut, I started receiving readers' complaints regarding a certain mail-order company, I of course investigated them. The complaints, about MacCenter, of Austin, Texas, all centered on the same problem: late shipping. A delivery date would come and go — in some cases weeks would pass — and only after extensive telephone tag with MacCenter's customer-service department (sometimes played at Wimbledon levels) would the customer discover the reason for the delay. Usually, MacCenter's reasons were perfectly straightforward — a shipment of defective printer-memory cards from its supplier, a drive mechanism that suddenly ended up in short supply — certainly MacCenter is innocent of any sneakiness in that regard.

So I'm writing about these complaints not because I've found a legitimate mud puppy to flay publicly but because in looking into the complaints and talking with John Stratton, MacCenter's president, a neat little trio of interesting topics surfaced. Also, the sheer volume of complaints (nine, which is seven more than I've received regarding any other company), all registering the same sad tale; the results of my investigations; and the fact that it is my job to write about matters consumeratorial meant that you folks might be well-served by my telling a bit of the MacCenter tale. If only to clear the company's name. Maybe. I don't want to give away the ending.

Shipping the Light Fantastic

Some of the complaints involved missing orders that MacCenter's records indicated had actually shipped via UPS. The reasons that some customers claim MacCenter gave them for the delay are, well, curious. In one instance, a MacCenter representative claimed that UPS had told her that a disputed delivery was so old that its records were on microfiche and retrieving them would take two days. In another, a claim was made that tracking a UPS package would take a couple of weeks; in another, UPS was said to have declared that a package claim was impossible, because 14 business days had not yet passed from the original shipping date.

These statements could be the result of miscommunication between MacCenter and UPS; nonetheless, they don't jibe with conversations I've had with a UPS employee responsible for tracking packages. According to him, UPS gave up on microfiche a long time ago, and all records regarding delivery are kept active for a period of about a year from the original shipping date, so accessing old files usually doesn't require a whole lot of time. A trace can be initiated at any time after the shipping date has come and gone.

As to the amount of time required to complete a trace, my UPS mole had this to say: "If a trace takes more than a week to complete, people tend to get fired." In addition, according to the UPS employee handbook, if a shipper needs to know the status of a package ASAP, the employee is required to provide some sort of answer within *one hour.* All the big-name shipping companies have policies requiring similarly speedy tracking.

Inquiries regarding the status of a package can be made by either the sender or the intended recipient, so whenever you place a large order with a mail-order company, it's a good idea to get a package-tracking number *before* you give out your credit-card number. With tracking number in hand, you can call a shipping company directly and get the straight poop yourself; without it, determining the status of a shipment without going through the mail-order company becomes extremely complicated. Granted, it might not be that easy for the employee taking phone orders to get instantaneous tracking numbers from the shipping department, but when there's an order worth hundreds or thousands of dollars in the balance, I like to think that a good mail-order outfit will go through the trouble for you.

The Better Business Bureau

Normally, the first thing you should do before you send a mail-order company a great deal of money is call the Better Business Bureau in its area. One of the many wonderful things about our capitalist society is that there's plenty of competition; if for one reason or another the BBB has given a company an Unsatisfactory rating, you usually have the option of taking your business elsewhere. Simple. The thing is, the Better Business Bureau isn't a government operation at any level (unlike a state's Office of Consumer Affairs) but merely an organization the local business community uses to police itself. The bureau also has very little real power to help consumers. When it receives a complaint

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regarding a local business, it forwards the consumer's letter to the business for comment and opens a file. If the business fails to report back to the BBB, explaining that either the problem's been solved or It Just Wasn't Our Fault, Honestly, the bureau may decide to stick an advisory alongside that company's name in its database.

MacCenter has (at this writing) an Unsatisfactory rating at the Austin BBB, due to its lack of response to consumer complaints. The file's been open since 1991. MacCenter's bad rating is interesting, if nothing else — chiefly because it's rather easy for a company to clear its record. All a company needs to do to wipe the slate clean is send the BBB a letter discussing how it has resolved its customers' complaints or the reasons why it feels no further action is necessary. Although personnel at the Austin Better Business Bureau refused to discuss specific details about the case, they did say they'd "love to hear from MacCenter." MacCenter's Mr. Stratton claims that MacCenter has, indeed, been in contact with the Better Business Bureau and that his company's current negative rating is in error. At this writing, however, he has failed to provide me with any documentation to back his claims.

If a UPS trace takes more than a week to complete, people tend to get fired.

The Final Analysis

When you look into complaints filed against a company, it's possible to come to three conclusions:

Hang the Weasels. If there are boatloads of complaints about a company — from irate customers as well as honest consumer columnists trying to get to the bottom of things — that go unanswered or if the company takes the money and runs, fails to deliver on its promises, and out-and-out lies and misleads its customers, then good riddance to it. There are plenty of retailers in the sea, and these losers just plain aren't worth the trouble. This is not the conclusion I've reached about MacCenter.

Poor, Poor Devils. Hey, when you deal with hundreds or even thousands of customers a year, there are bound to be a few slipups. And customers are human beings too: Sometimes they make mistakes; forget they received the merchandise they paid for; or for one reason or another or no reason at all, rail against a company. When a company has gone above and beyond the call of duty to placate an irate customer or apparently has become the victim of cranks with no evidence to support their allegations, we should consider the case closed and continue on, business as usual. This isn't the conclusion I've reached about MacCenter either.

Six of One, Half a Dozen of the Other. Given all the evidence, you may decide that there are some verifiable problems to the case, but the company doesn't seem to be composed of a bunch of money-grubbing weasels. This is the conclusion I've reached about MacCenter. Here's why:

In MacCenter's favor, the company was (generally) responsive to complaints. According to the irate customers who complained to me, MacCenter had returned their phone calls and had made some attempt to solve their troubles. There doesn't seem to be real evidence of an attempt to defraud, based on the letters I received (that is, the company wasn't going around misrepresenting its products or pulling any weaseling), and as far as I can tell, MacCenter in all cases properly did not charge customers' credit cards until it had actually shipped the items.

Now the bad news: There's evidence that MacCenter's customer-service employees have been (at the least) misinformed on several occasions, and in the cases I've received complaints about, the company failed to notify its customers when, for one reason or another, a shipment would not arrive as promised. Also, this whole matter about the Better Business Bureau is troubling, to say the least: Any time there's a longtime file on a company and that company's official response is that the BBB is full of it, well, it certainly makes one's antennae twitch.

To be sure, MacCenter is a large, well-established, and generally well-regarded company with loads of satisfied customers. History tends to demonstrate that if a company is fundamentally messed up and mistreats its customers as a matter of corporate policy, it doesn't last long. So here's my conclusion: I wouldn't write off MacCenter, but it's a situation I will

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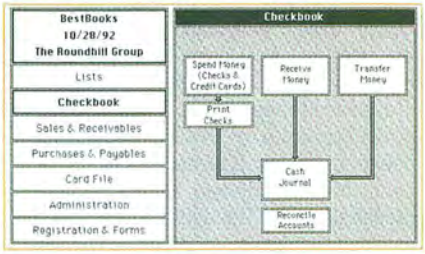
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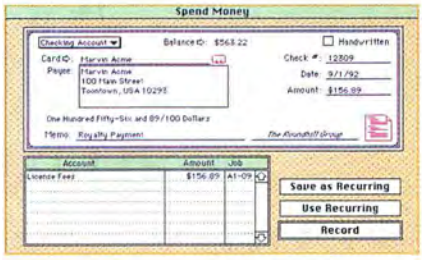
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continue to monitor closely. In the meantime, continue to order from the company if you feel it offers you the products and service you want at great prices, but be sure to use a high level of caution. When you place your order, ask if the item is actually in stock at the moment and get an exact date by which you can expect shipment. If the shipment fails to arrive on time, cancel the order. Again, the chief operational problem with MacCenter seems to lie in shipping; considering the somewhat-bad track record of notifying customers about delays, you need to be unusually vigilant and keep an itchy trigger finger.

Parting Shots: Where to Buy

If any extra information regarding MacCenter comes to light or if MacCenter feels that some of the things in this column need further clarification, I'll be writing an update and slapping it right here in this section, which is dedicated to revealing The Final Chapter of past columns such as January's treatise on places to shop for Macs.

An avalanche of letters (all right, three) came in from people reporting that they had bought their Macs through the mail and that they were indeed covered by a full, standard Apple warranty. As I said in the column, even though there's a risk that a mail-order Mac will arrive without a warranty, many outfits are "legitimate" (in Apple's opinion) dealers whose products ship with full warranties.

Another deluge of mail (four letters — clearly they're not making deluges the way they used to) came in response to my information on how to buy Macs dirt-cheap through Apple's educational-pricing program by properly obtaining a part-time-student ID from the college of your choice. Although there's nothing illegal about the practice, I do feel compelled to apologize to those folks who were offended by the idea of thousands of cheapskates removing Macs from the educational channel. I included the info chiefly because I knew (a) it was more interesting than saying, "If you have a valid student ID, you can participate; if you don't, you can't," and (b) that the odds of finding a campus computer store that accepts a part-time ID for a Mac purchase are cozily long. Here in Boston, where if you heave a brick off the Longfellow Bridge, you'll scrape ivy off the walls of at least a dozen accredited universities, there's only one that accepts a part-time ID. Nonetheless, my apologies to all offended.

As always, your input is appreciated. If you have something particularly good or bad to say about a product, company, or this column itself, send it on in to me, care of *MacUser*, 950 Tower Lane, 18th Floor, Foster City, CA 94404. If you're modem-studly, go ahead and send me E-mail (Internet: andyi@world,std,com; CompuServe: 72511,204; America Online: andyi).



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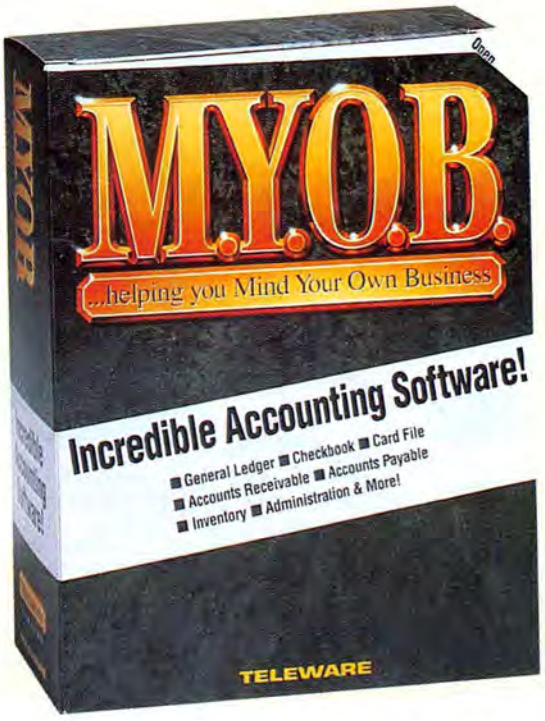
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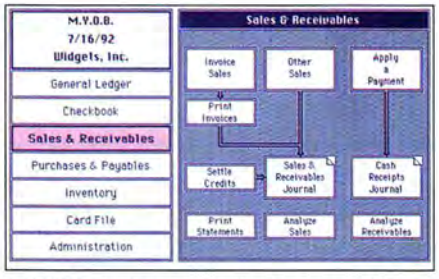
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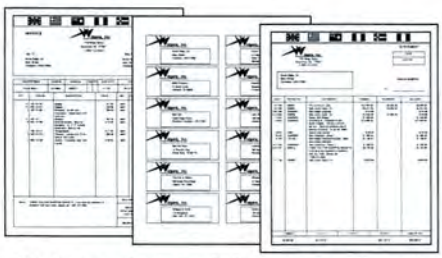
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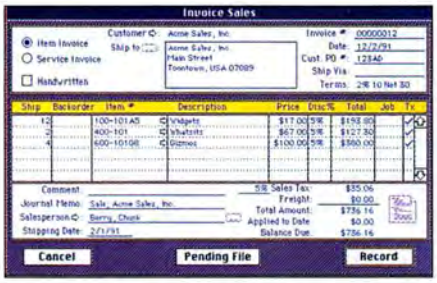
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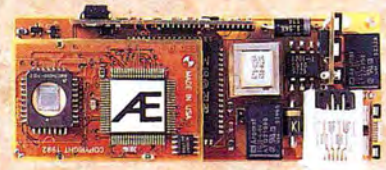
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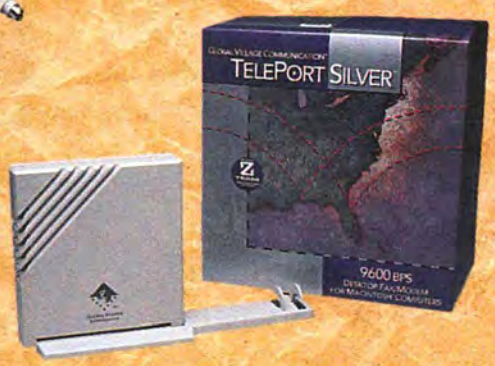
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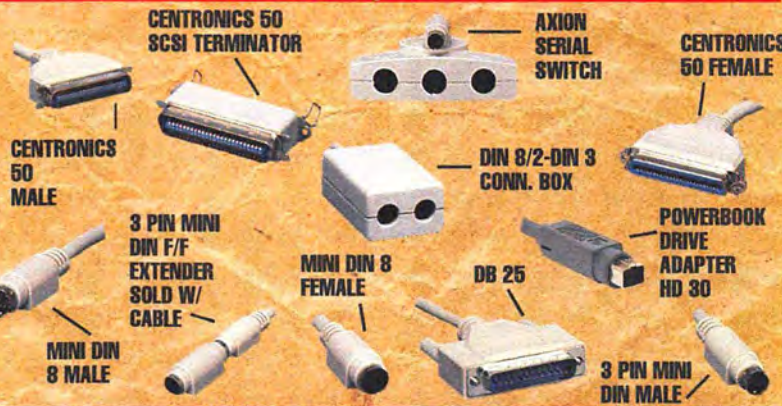




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FONTS

05964 Fluent Laser Fonts Lib Two $98
04537 Fontographer 3.5 $258

GRAPHS

00203 Cricket Graph III 1.0 $118
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ILLUSTRATION

06263 Adobe Dimensions $98
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00803 Canvas 3.0 $258
05925 Morph 1.1 $95
01220 MS PowerPoint 3.0 $328
06157 Sketcher $98
03971 Streamline 2.0 $121

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04042 Adobe Photoshop 2.5 for Mac $548
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06299 MS PowerPoint 3.0 Upgr $98
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00839 MacroMedia Director 3.1 $798
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06310 MacroModel $998
04088 Stratavision 3D 2.5 $628

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04955 Auto Doubler 2.0 $58
03515 Disk Doubler 3.7 $48
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04320 Universal PowerCache 40MHz/FPU $685
04319 Universal PowerCache 40 MHz $594
04321 Universal PowerCache 50MHz $776
04322 Universal PowerCache 50MHz/FPU $914

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05354 Full Cycle Battery Charger $138
09521 Kensington MasterPiece Plus $98

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05685 PowerPort Silver $438
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00062 Prometheus Ultima Ext $269
04351 Supra Fax Modem Plus $178
00414 Supra Fax Modem V.32BIS w/o sft cable .. $319
00413 Supra Fax Modem V.32BIS w sft cable ... $349
00424 Supra Fax Modem V.32 w/o sft cable $259
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06267 TelePort Gold $438

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04985 NEC Mac FG 24X Clr Display Interface Crd00 $1284
07144 NEC Multisync 15 Mon 3FGX $658
07143 NEC Multisync 15 Mon 4FG $778
07399 NEC Multisync 17 Mon 5FG $1398
07182 NEC Multisync 21 Mon 6FG $2698
00578 NEC Mac FG8X Clr Display Interface card00 $718
05496 Precision Clr 24XP $538
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04899 Radius Precision Clr 20" $2489
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06315 Spectrum/24 PDQ Plus $1648
05117 Spectrum/24 Series IV $872
05123 SuperMatch 17 Multimode Clr. $999
06100 SuperMatch 17 T Trinitron Color Display $1149
05127 SuperMatch 20 Clr Display $1618
06234 SuperMatch 20 T Multmode Trinitron Clr Display $2698

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05431 QuickTime Starter Kit $104
05650 Radius Video Vision $2098
00613 Video Spigot NuBus $37

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02540 AsanteHub 12 Port w/SNMP Option Module $958
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00832 Phonenet DIN 8 PN308 $31
04491 Shiva NetModem E Thin/BNC $1478

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05068 Apple StyleWriter Ink Refill System Black/2Pak $14
11660 NEC M95FX W/Postscrip Fax $2075
01032 NEC Silent Writer M95 $1544
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00520 Lightning Scan Pro 256 $488
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00599 Umax 24bit UC 630 w/Photoshop $1249

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05848 NEC Multmedia Gall MacW/CDR74 $878
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05813 PLIDAT 3.5 4 Gig w/Built in Compres. for 8 Gigs $1699
02181 PLI Infinity 40 Turbo HD Rem $553
00182 PLI Infinity 88 Turbo HD $648
04698 PLI Infinity Opt Sony 3.5 128MB $1498
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Performantz 44/88MB Removable Drive $699



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#06223 Performantz 210MB Int $598
#06224 Performantz 425MB Int $698
#06330 Performantz 44MB Rem $1288
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#06226 Performantz Mac LC/si Int Mounting Kit $15
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$44 per MB

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Plus / SE 1MB standard	Plus/SE	2.5	Two 1MB SIMMs	1	05653	$88
	Plus/SE	4	Four 1MB SIMMs	2	05653	$176
Classic *with adapter 1MB standard	Classic	2	One 1MB SIMM	1	03824	$118
	Classic	4*	Two 1MB SIMMs	1	05653	$88
Classic II, LC 2MB standard	Classic II, LC	4	Two 1MB SIMMs	1	05653	$88
	Classic II, LC	6	Two 2MB SIMMs	1	05655	$168
	Classic II, LC	10	Two 4MB SIMMs	1	05656	$310
SE/30 1MB standard	SE/30	8	Eight 1MB SIMMs	4	05653	$352
	SE/30	17	Four 4MB SIMMs	1	05654	$619
	SE/30	32	Eight 4MB SIMMs	2	05654	$1,238
Performa 200 4MB standard	Performa 200	6	Two 2MB SIMMs	1	05655	$168
	Performa 200	10	Two 4MB SIMMs	1	05656	$310
Performa 400, LCII 4MB standard	Performa 400/LC II	6	Two 1MB SIMMs	1	05653	$88
	Performa 400/LC II	10	Two 4MB SIMMs	1	05656	$310
Mac II, Mac IIx 1MB standard	II/IIx	8	Eight 1MB SIMMs	4	05653	$352
	II/IIx	17	Four 4MB SIMMs	1	05819	$619
	II/IIx	32	Eight 4MB SIMMs	2	05819	$1,238
Mac IIci Mac IIcx 1MB standard	IIci/IIcx	8	Eight 1MB SIMMs	4	05653	$352
	IIci/IIcx	17	Four 4MB SIMMs	1	05654	$619
	IIci/IIcx	32	Eight 4MB SIMMs	2	05654	$1,238
	IIci/IIcx	64	Eight 8MB SIMMs	8	00848	$2,704
	IIci/IIcx	128	Eight 16MB SIMMs	8	06464	$4,976
Mac IIsi 1MB standard	IIsi	5	Four 1MB SIMMs	2	05653	$176
	IIsi	9	Four 2MB SIMMs	2	05655	$336
	IIsi	17	Four 4MB SIMMs	1	05654	$619
	IIsi	33	Four 8MB SIMMs	4	00848	$1,352
	IIsi	65	Four 16MB SIMMs	4	06464	$2,488
Mac IIfx 4MB standard	IIfx	8	Four 1MB SIMMs	1	05659	$175
	IIfx	20	Four 4MB SIMMs	1	05660	$619
	IIfx	32	Eight 4MB SIMMs	2	05660	$1,238
	IIfx	128	Eight 16MB SIMMs	8	05129	$4,976
IIvx, IIvi Performa 600 4MB standard	IIvx/IIvi/Performa 600	8	Four 1MB SIMMs	2	05653	$176
	IIvx/IIvi/Performa 600	12	Four 2MB SIMMs	2	05655	$336
	IIvx/IIvi/Performa 600	20	Four 4MB SIMMs	1	05654	$619
	IIvx/IIvi/Performa 600	36	Four 8MB SIMMs	4	00848	$1,352
	IIvx/IIvi/Performa 600	68	Four 16MB SIMMs	4	06464	$2,488
Quadra 700,900,950 4MB standard	Quadra 700	8	Four 1MB SIMMs	2	05653	$176
	Quadra 700	20	Four 4MB SIMMs	1	05654	$619
	Quadra 700	36	Four 8MB SIMMs	4	00848	$1,352
	Quadra 700	68	Four 16MB SIMMs	4	06464	$2,488
	Quadra 900/950	20	Four 4MB SIMMs	1	05654	$619
	Quadra 900/950	52	Twelve 4MB SIMMs	3	05654	$1,857
	Quadra 900/950	64	Sixteen 4MB SIMMs	4	05654	$2,476
	Quadra 900/950	128	Sixteen 8MB SIMMs	16	00848	$5,408
	Quadra 900/950	256	Sixteen 16MB SIMMs	16	00849	$9,568

FREE! SIMM Installation Guide



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#06303 Works 1:2 $158

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The new WordPerfect 2.1 is System 7 Savvy! WordPerfect 2.1 also gives you full placement of graphics in your text and a color drawing program for modifying imported artwork without ever leaving the program.. Full version of Grammatik included. WordPerfect Corporation #05013 ✔

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SAVE $62

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Keep your life running smoothly with **DateBook**, the Macintosh personal organizer that enables you to enter and keep track of appointments, schedules and things-to-do. **TouchBASE** is a handy database which keeps track of personal and business contacts. After Hours Software #06167

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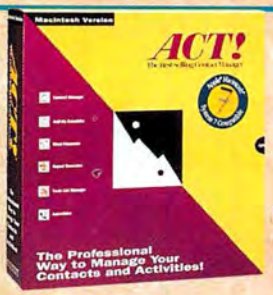
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ALERT!

Avoid frustrating software incompatibility problems with ALERT! It automatically analyzes and reports conflicts on any Macintosh running System 7 or later. Unlike most other conflict-reporting applications, MAXA's ALERT! has the ability to "turn off" and "turn on" INITs, system extensions and background applications to help you identify conflicts. Fully networkable. MAXA #06602

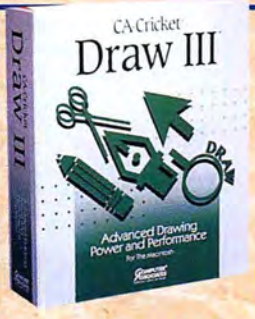


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ACT! for the Mac Competitive Upgrade

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#06231 ACT! for the Mac $248



Low, Low Price!

$164

CA-Cricket Draw III

CA-Cricket Draw is the intuitive, object-oriented drawing program for producing professional-quality graphics on the Mac. It brings high-end drawing power to every level of user with its Bezier-based tool palette, object-to-Bezier path conversion, interactive and flexible color interface, comprehensive text processing and powerful PostScript special effects. Computer Associates #04414

$42



Quicken 3.0

Quicken 3.0 for the Macintosh organizes your personal and small business finances: from bank accounts to cash, credit cards, assets and liabilities. It pays your bills, balances your checkbook, keeps you on budget, cuts your tax preparation time to minutes and tells you exactly where your money goes. Intuit, Inc. #04230

CODE #30401

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Aldus SuperPaint 3.5

Meet the user's choice for outstanding general purpose graphics. And talk about versatility—start with the spontaneity of painting, factor in the precision of drawing, then top it all off with the capability to perform equally well in either b&w or color and you've got SuperPaint. The graphics solution for every situation.

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Square One

Simplify your desktop and your life with Square One, the new easy way to manage all of your frequently used applications, documents and other items. It allows you to keep all of these items in one window for easy, intuitive access. All of your applications appear in a palette at the top of the window. Each installed application can have an unlimited number of associated documents. These documents are accessible either in a list below the palette, or by clicking and holding on any of the applications. Binary Software #06592

NEW PRODUCT

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$328

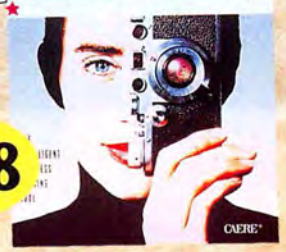


Image Assistant

Put your best image forward with Image Assistant, the exciting new color image-editing technology from Caere. Based on an innovative product design and user interface, Image Assistant is the easy-to-learn, easy-to-use 24-bit color image-editing product that you'll never outgrow.

Caere #06338

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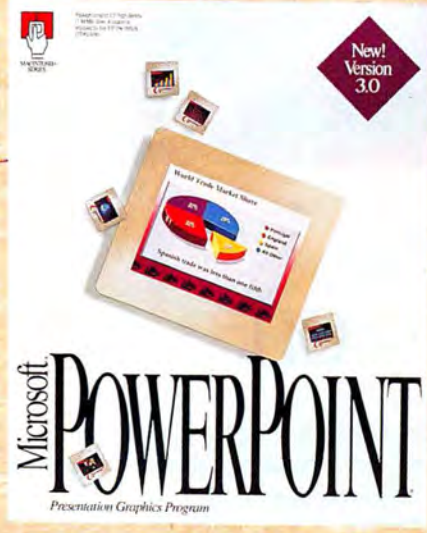
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EDITORS CHOICE AWARDS – MACUSER MAGAZINE

Microsoft PowerPoint 3.0 Competitive Upgrade

Now you don't have to rely on outside sources to produce slides and overheads for your presentations. Microsoft PowerPoint for the Macintosh allows you to make slides and overheads directly on your Mac! Upgrade now from a competing presentation graphics program (requires proof of ownership) and receive PowerPoint 3.0 for this enticing competitive upgrade price. Requires proof of ownership of a competing presentation software product. Microsoft #06300

#06299 PowerPoint 3.0 Version Upgr $98

#01220 PowerPoint 3.0 $328





PowerMerge

$84

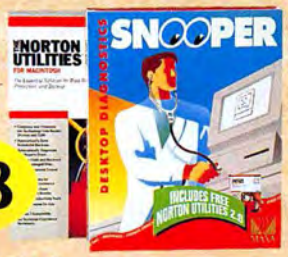
Keep the files on your desktop Mac in sync with those on your PowerBook with PowerMerge. It identifies which computer has the most recent version of each file, updates the older versions with the newer ones and adds any new files and folders that have been created. It's fully System 6 and 7 compatible. Synchronizes any two Macs by direct link, network access or removable media. Leader Technologies #05690

PowerMerge: Special Features

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FREE VIREX

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Desalinization Test Results

Effective November 12, 1992

Over the past 40 years DeSal, Inc. has been conducting tests on the effectiveness of US and Worldwide brand desalination plants. The results are surprising and the following table shows the volume (in parts per million) of residual compound A and compound B (see appendix IVX) after processing.

Samples have been aggregated and averaged from 27 sites distributed evenly between USA, the Middle East, and Guam.

Sample data	Compound A (ppm)	Compound B (ppm)
0 to 5 years	10	35
5 to 10 years	15	15
10 to 15 years	27	13
15 to 20 years	40	20
20 to 25 years	39	25
25 to 30 years	35	35
30 to 35 years	25	42
35 to 40 years	25	45

While these results are far from alarming they indicate the cyclic oscillations of the compound A and compound B residues. The levels are in fact well within the FDA guidelines for city potable water but we would like to see these levels halved. Computer analysis shows that the compound A and compound B levels are intimately connected and the cycle period appears to be approximately 30 years.

I would like to point out that this coincides precisely with increased sun spot activity. We believe that the EM radiation in the extreme high bandwidth is the factor most likely to be causing this phenomenon.

DeSal, Inc. will continue its diligent testing over the next 30 years after which time a further 4 years will be required for processing and analyzing the collected data. Meanwhile I would like to assure all our customers that there is absolutely nothing to fear from drinking water processed by our desalination systems.

Sincerely,

H. T. Eau
President and CEO
DeSal, Inc.

BLAH.

MEMO

DATE: November 12, 1992

TO: ALL MANAGERS

FM: TED SCRAMP
GEOLOGIC RESOURCES

RE: EARTHQUAKE AWARENESS

For your convenience the Geological Resource Center has compiled detailed topological data for your geographic area. The results tend to indicate that there is an increased likelihood of earthquake activity in your immediate vicinity. Please review the data below. I think you will notice that there is a definite trend.

	NW Coordinates									
SE Offset	010	020	030	040	050	060	070	080	090	
10'	12	14	16	18	18	20	21	19	22	
11'	13	15	18	20	18	21	21	18	24	
12'	14	15	18	21	20	20	22	19	24	
13'	13	14	17	20	22	22	22	20	23	
14'	12	13	16	21	20	20	21	19	22	
15'	12	14	16	18	18	20	21	19	22	
16'	13	15	18	20	18	21	21	18	24	
17'	14	15	18	21	20	20	22	19	24	
18'	13	14	17	20	22	22	22	20	23	
19'	12	13	16	21	20	20	21	19	22	
10'	12	14	16	18	18	20	21	19	22	
11'	13	15	18	20	18	21	21	18	24	
12'	14	15	18	21	20	20	22	19	24	
13'	13	14	17	20	22	22	22	20	23	
14'	12	13	16	21	20	20	21	19	22	

This data may be a little complex and difficult to follow but feel free to call me during office hours and I'll be happy to spend as much time as needed to explain the relevance of the above table.

REMINDER
All surveys after November 1992 are chargeable at the full rate as detailed in the recent price adjustment sheet sent to all customers.

BLAH.

Coastal Region Report

The Operating Committee at its annual meeting held in Hawaii in October 1992 reviewed a recent report from the Salines Corporation. This report contrasted the cost of "conventional water" with desalinated water. The cost of producing desalinated water is on the whole no lower than the cost of processing water conventionally. There are some areas however where we noted some cost differences, the differences are most notable in the areas of labor and energy. Labor costs for desalinating are just 50% of conventional and energy costs are some 30% lower.

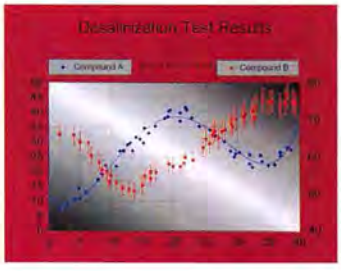
At the other end of the scale, materials costs are almost 20% higher than conventional. Land costs are lower, probably because coastal land is cheaper and less land is required. Over the next seven months we will be deciding exactly what the company future policy will be regarding development of water systems for the city.

In case any of this is unclear let me restate it:

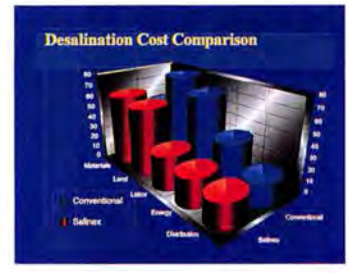
1. The cost of producing desalinated water is on the whole no lower than the cost of processing water conventionally.
2. There are some areas of cost difference, the differences are most notable in the areas of labor and energy.
3. Labor costs for desalinating are just 50% of conventional and energy costs are some 30% lower.
4. Materials costs for desalinating are almost 20% higher than conventional production.

It is the responsibility and public duty of the Operating Committee to conclude it's surveys within the next four months and make recommendations to the Operating Sub-Committee. The Operating Sub-Committee will then prepare full budget plans for submission to the city council for posting at a subsequent City meeting.

BLAH.







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CIRCLE 76 ON READER SERVICE CARD.

MICHAEL SWAINE

Users and Lusers



When true user scripting comes to the Mac (and it will), it's going to make things easier, not harder.

The casual pedestrian passing by the bar that night might have wondered who was scalding cats and why. But those of us inside knew the sounds escaping from the stage to be the heart wail of a disk-drive engineer in whose hands someone had injudiciously placed an electric guitar.

It was another *MacUser* jam, the semi-annual music orgy that brings together *MacUser* editors and staff and Macworld Expo attendees for a night of instrument abuse. I was standing on the sidelines with my instrument of choice (no instrument, that is, and a popular choice it was, too) when, as sometimes happens at such events despite one's best intentions, I ran into an actual reader.

"About your claim that users will all become scripters in the future . . ." he screamed into my ear over the strains of "Johnny B. Goode."

I bobbed my head up and down, and he wagged his head back and forth while extending a fist, thumb downward.

I shrewdly intuited that he disagreed with the premise of my column, whatever it might have been — I tend to forget these things as soon as I upload them. But he lost no time in acquainting me with the particulars of his disagreement, and I sipped thoughtfully at my beer while he made the introduction. He worked for a company that had provided scripting to its customers, and he felt that he knew a thing or two about the value of user scripting. The trouble with scripting, he went on after the trumpet section had finished, is that it's too complex. I nodded vigorously, but he went on. Not only that, scripting languages work at the wrong level. To open a file in the Finder, all you have to do is double-click on its icon, but to open a file in HyperTalk, you have to memorize the syntax of the Open File command.

I grasped his point, but he snatched it back and hit me over the head with it again. What this leads to, he said, are headaches and unnecessary work for support personnel. That was what had caused his company's user-scripting efforts to come crashing down: It was just too hard to support scripters. There were too many things they could do wrong, and they did them all.

Oh, but I wasn't talking about *that*, I told him. I admitted that only a minority of users could be expected to become Frontier UserTalk scripters. Nor did I have the HyperTalk model in mind, exactly, when I argued that all users would someday be scripters. And as for current scripting languages working at the wrong level, I couldn't agree with him more. The kind of scripting language I had in mind didn't exist yet, I told him, but when it did, it would make things easier for users, not harder.

He left smiling, but whether it was because he had made the columnist swallow his words or because he had become a new convert to the user-scripting faith, I couldn't say for sure. I mused, leaning against the wall. The trouble was that it's hard to speak convincingly about something that doesn't exist yet. Sure, the English language is a powerful tool for expressing abstract thought, but sometimes you need to cut through the abstractions and just *point.*

At this juncture, I gestured emphatically and emptied half a bottle of Anchor Steam beer onto a violinist who was tuning up in the wings, and the ensuing discussion took my mind off scripting for some time.

Still, my faith remains strong that we computer users will all become scripters, that the transformation is already underway, and that this development is the most important thing going on in computing today. So I'll explain it all again. Please pay attention this time.

Hackers and Lusers

To understand why we users will all become scripters, it is necessary to go back into prehistory, back to the primordial ooze from which the modern personal computer crawled, back to the basements of MIT, circa 1970.

In the beginning, there were only "hackers" and "lusers." Hackers, of course, invented both names.

Hackers were those who had something on the computer and could blackmail the machine into doing what they wanted it to do. What they lacked was a life, which limited them somewhat when it came to deciding what they wanted the machine to do. Like a pimply adolescent boy at the wheel of a car for the first time who turns to his friends and says, "Gee, I dunno, what do you want to do?" hackers would have turned to their friends, if they had had any, for guidance. Instead, they turned to the machine.

What hackers wanted to do was whatever the machine was capable of doing. To them, making the machine do whatever it was doing faster was an accomplishment, and the

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MICHAEL SWAINE

value of the accomplishment was measured by the gain in speed, not by the value of what the machine was doing.

Back in those prehistoric times, nobody talked about interfaces, but there was a hacker interface. There was exactly one, and there would never be any other. Although its form would change and it would be shrink-wrapped into a confusing variety of products in later years, the hacker interface would always be a language. The logic was inescapable: Hackers wanted to be able to tell the machine to do whatever it could do. The set of things a general-purpose computer can do is of a level of complexity that cannot be described by a finite set of commands but only by an open-ended system including a vocabulary and a set of combining rules, or a grammar. An open-ended system including a vocabulary and a grammar is a language. So hackers interacted with computers via a language.

We computer users will all become scripters. The transformation is underway, and this development is the most important thing in computing today.

The people the hackers called lusers, on the other hand, memorized what buttons they had been told to press and were otherwise clueless. Lusers might be intelligent and highly skilled professionals with a high salary and a fast car. It didn't matter. To hackers, lusers were button-pushers, drones. Lusers didn't see it this way, of course.

The finite set of buttons to push was the luser interface. Or it may have been a set of commands to type or a set of gestures to make. What distinguished the luser interface was that it consisted of a finite set of things to do, with little or no provision for combining operations into a new operation. The luser interface is still with us. It's the right kind of interface if you only need to select which of a finite set of operations you want the machine to perform. The Macintosh desktop is a luser interface.

Leaping forward to the present, we find that random mutation has produced a new species of human for interacting with computers, sometimes called The Rest Of Us, sometimes just called computer users. We computer users see the computer as a general-purpose tool for getting jobs done. *Our* jobs, not its jobs. Unlike the primitive hackers, we have little interest in how the machine does what it does, but we do have interests other than how the machine does what it does.

Nor are we lusers. Not content merely to push the buttons we're told to push, we ask awkward questions such as, Why doesn't it do this and When will it?

There are now more of us than there are of hackers and lusers. You'd think there would be an interface for us too. But for all the talk about user interfaces, there is no such thing. Computer interfaces today are all variations on the luser interface or the hacker interface. If they aren't just buttons to push, they make you open files the hard way.

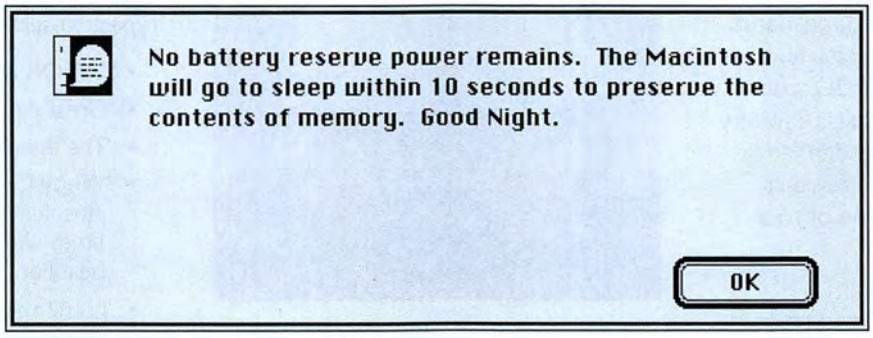
Conventional wisdom has it that programming is complicated and difficult, but the truth is, it's really just obscure. Most of us do work that is as complicated and open-ended as programming. Carpenters, gardeners, chefs, and even writers toil in a real world no less open-ended than the artificial world of hackers. It should be obvious that if we are going to incorporate computers into that world, we need to communicate with them by using a language. The reason that it isn't obvious is that our only examples of computer languages are bit-twiddling hacker languages that have nothing to do with our work, or with anything else real.

Here's the relevant principle; commit it to memory: A computer language for carpenters should be *and can be* based on the vocabulary of carpentry, and it should be *and can be* as easy to grasp as carpentry itself. Any complexities in a carpentry language that don't come from the complexities of carpentry itself are unnecessary hacker glop.

I call the use of such a language *scripting*, because that is today's vogue term for user programming. But scripting needn't mean writing scripts; there are other kinds of languages, languages of gestures or icons.

I wish I could tell you exactly what the user scripting language in your future will look like, but I can't. All I know is it'll look like your work.

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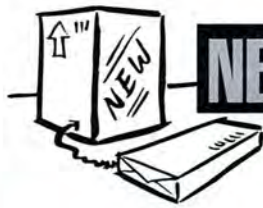
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P · I · X · A · R

CIRCLE 87 ON READER SERVICE CARD.



NEW ON THE MENU

Although Apple's new CPUs have been garnering most of the hype this month, Apple has also quietly introduced a new line of low-end laser printers. The prices for the LaserWriter Select printers are attractive, but their feature sets leave us scratching our heads.



The Select 300 and 310 printers are the first Apple models based on a non-Canon engine; they use the new Fuji Xerox engine that Compaq uses in its printers. Intended for personal use only (no networking), the Select models offer 5-ppm, 300-dpi printing, with a 250-sheet tray standard, an optional 30-envelope cassette ($89), and optional 250-sheet ($149) and 500-sheet ($299) bins.

The **LaserWriter Select 300** ($819) is a QuickDraw printer that comes with 39 TrueType fonts and Apple's FinePrint resolution-enhancement technology. For better halftones and as many as 90 shades of gray, you can add PhotoGrade — if you install a 4-megabyte memory upgrade ($269) to raise the RAM capacity to the maximum of 4.5 megabytes. Although the Select 300 isn't networkable, you can share it via GrayShare. (An upgrade kit for converting a Select 300 to a Select 310 will be available for $349.)



The **LaserWriter Select 310** ($1,079) is Apple's "higher end" model. It's a PostScript printer, but it uses Level 1 PostScript, not Level 2, and it doesn't support FinePrint or PhotoGrade — even as options. It uses AMD's 29205 RISC processor and has 1.5 megabytes of RAM, but even adding the 4-megabyte RAM upgrade ($269) gives you only more font space and the ability to print larger documents — no resolution enhancements. It includes serial and parallel ports for direct-connect Mac/Windows compatibility, but it doesn't offer any network support — not even GrayShare. It comes with 13 fonts, a combination of Type 1 outlines in ROM for printing and TrueType versions for the screen, but that's still only a third as many as the Select 300 offers and far short of the complete LaserWriter Plus set of 35.

The Select printers replace the Personal LaserWriter LS as the low end in Apple's laser-printer line. We're still not sure how well they actually fill the bill, but there you have it.

Up to Date . . .

StrataVision 3d 2.6 boasts direct Adobe Illustrator import, EPS export, alpha-channel support, and 25-to-30-percent-faster screen redraws. 801-628-5218. $995. ◆ **Theorist 1.5** is the first upgrade to Prescience's math processor. Enhancements include table functions that let users treat data sets like functions, the ability to save animated graphs as QuickTime movies, and more graph types. 415-543-2252. $449.95. ◆ **DayStar Digital** has slashed the prices on all of its accelerators by 20 to 38 percent. For example, the price of the 50-megahertz PowerCache has dropped $600, from $1,599 to $999. 800-962-2077 or 404-967-2077.

By Russell Ito

Presenting: Astound

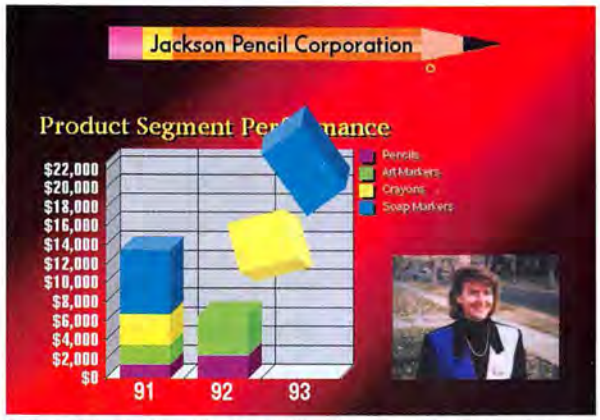
You've got the slides-and-handouts routine down pat, but those static presentations are starting to seem dull. You'd like to liven them up, but you don't want to start over with some foreign-seeming multimedia application. Enter Astound, a new presentation package from Gold Disk.

Astound uses the familiar outline-and-slides metaphor you've seen in static-presentation products such as Persuasion and PowerPoint — in fact, you can import files from both programs — and has the outliner and slide-presentation tools you'd expect, but it also enables you to add distinctly nonstatic elements for on-screen presentations. With Astound, you can add and edit sounds such as music and narration; import animated clips in PICS or Animation Works format; and animate text and other objects (including QuickTime movies and objects drawn with Astound's tools) that move across the slide, using user-specified timing and transition effects.

In addition, you can animate charts and graphs that you have created with Astound's charting tools — for example, having the bars for a bar graph tumble in from the edges of a slide.

Astound also lets you create interactive presentations — you can add buttons that play sound or move you to other slides. And you can distribute your presentations to Mac as well as Windows users, in that Astound includes run-time players for both platforms. Quite a deal, considering Astound's astounding introductory price: $99 until May 31, 1993.

Gold Disk, 385 Van Ness Avenue, Suite 110, Torrance, CA, 90501; 310-320-5080. $399.

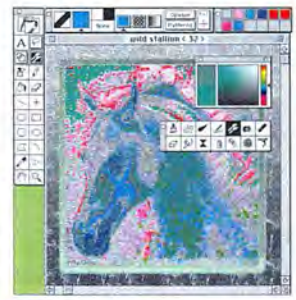


Using dancing bar charts and having QuickTime movies slide across your screen are just two of the ways you can liven up presentations with Astound, from Gold Disk.

Souped-Up SuperPaint

Faster than a speeding bullet it may not be, at least where time to market is concerned, but Aldus' new version of SuperPaint leaps several tall hurdles in a single (or .5 of a single) bound. Version 3.5 of the venerable drawing and painting program features support for a variety of new technologies and includes new plug-in tools, templates for common business and personal documents, and sample Gallery Effects textures.

New technologies supported include QuickTime and Kodak's Photo CD (for placing frames or pictures from either into SuperPaint), the TWAIN imaging standard (for scanning images directly into SuperPaint), System 7 (full access to its features), and pressure-sensitive-tablet input.



Version 3.5 of Aldus' SuperPaint gives you a wealth of new plug-in tools — some are pressure-variable even without the use of a pressure-sensitive tablet — plus sample textures, templates, and support for QuickTime and Photo CD.

SuperPaint 3.5 also includes several new tools with which you can vary pressure even without a tablet, by varying the speed at which you drag them, for example; these tools include the magic marker, calligraphy brush, twister, variable-sized eraser, texture brush, smudge, and charcoal tools. Another new feature, Copy Brush, lets you "paint" a copy of a scanned image, either directly or as modified by one of the visual effects included with the program. The Gallery Effects textures included with the program are Wood, Stone, Brick, Marble, and a stucco-ish Wall.

Aldus has also improved SuperPaint's compatibility with EPS and TIFF files, which you should be able to import and export more successfully now (yay!).

Aldus Corp., Consumer Division, 9770 Carroll Center Road, Suite J, San Diego, CA 92126; 619-695-6956. $199.

Affordable Animation in 3-D

To veterans of animation festivals featuring squashy clay characters in 3-D worlds, the name Will Vinton's Playmation is sure to sound familiar. Yep, it's Will Vinton of Claymation fame, lending his name to a 3-D-animation package ported from the Amiga to Windows and now to the Mac — maintaining full file and object compatibility with the Windows version.

Playmation offers an impressive combination of modeling, animation, and rendering features at a price well below that of other Mac 3-D-animation programs. Its modeling is spline-based (with easy attachment of spline patches) to provide smooth curved surfaces without faceted polygon edging. You can wrap bit-mapped images (including bump maps and transparency maps) around the wire-frame objects or characters you create; you animate them by positioning them in key frames (Playmation creates the in-between movement in 3-D) and specifying movement along spline paths. Playmation also offers a set of skeletal and muscular movements plus libraries of motions you can save and reuse. Once you have all the movements down for your



If you thought Claymation was cool, look out for Will Vinton's Playmation, a 3-D-animation program with a surprisingly wide feature set for its $499 price.

objects and characters, you can direct how you want the camera and multiple lights to track them. Then you let Playmation render the animation, using ray tracing.

QuickTime output is nonstandard in its dimensions — 176 x 120 or 320 x 200 pixels, rather than 160 x 120 or 320 x 240 — and it's 8-bit unless you buy the optional Render 24 module, which costs $100. Render 24 supports broadcast-quality 16- and 32-bit QuickTime output and film-quality output in the Targa film format.

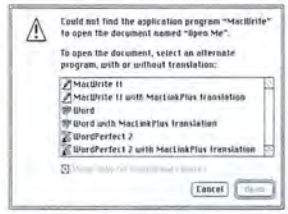
Anjon & Associates, 714 E. Angeleno, Unit C, Burbank, CA 91501; 818-566-8551. $499.

Open, Document!

Among the Mac's most irritating dialog boxes is the one that says, "The document 'such-and-such' could not be opened, because the application program that created it could not be found." "Well, open it with another application," you might fume, "or translate it or something!" But the Mac won't tell you about these alternative options — unless you have the new Macintosh Easy Open extension to System 7.

With MEO and compatible translation applications on your Mac, you no longer get that can't-open-it dialog box when you try to open a Mac or PC file for which you don't have the creator application. Instead, MEO searches for applications and translators that can open the document and lists them. When you select one, MEO handles the translation transparently and opens the document. You can also use your MEO-savvy translation application to create icons for drag-and-drop document conversions.

In addition, MEO enhances the Finder and the Open and Save dialog boxes to give you more information about document formats. In the Finder, it provides more information in the Kind column about what kind of document you're looking at — for example, that it's a non-Mac document. In the Open and Save dialog boxes, MEO displays the appropriate color icon for each type of document.



A Mac dialog box that actually *helps* you open documents for which you don't have the application? Apple's new Macintosh Easy Open extension to System 7 gives you that and more, with the help of compatible translation applications such as DataViz's MacLinkPlus/ Translators.

At press time, MEO was available only to developers, in the $150 MEO Developer's Kit (licensing costs extra). Apple said that MEO would be included in the next major system-software release, but it declined to say when this release would occur. By the time you read this, MEO should be included in Mastersoft's Word for Word/Macintosh 5.2 and DataViz's MacLinkPlus/PC 7.0.2 and MacLinkPlus/Translators 7.0.2. Other companies that are working on integrating MEO into their products include Aladdin Systems (StuffIt), Equilibrium Technologies (DeBabelizer), and Kandu Software (CADMover).

Apple Programmers & Developers Association (APDA); P.O. Box 319, Buffalo, NY 14207; 800-282-2732 or 716-871-6555. $150.

— By Karen J. Ohlson

NewsLine

Reports and Analysis

Digital-Messaging Magic Coming Soon

The last time consumer-electronics giants Sony and Philips got together to agree on a standard, we got CD-ROMs. Now these two companies, along with Matsushita (parent company of Panasonic), Apple, Motorola, and AT&T, have joined forces with General Magic (the company Apple veterans Bill Atkinson and Andy Hertzfeld formed after helping launch the Mac) to bring a new standard into our lives: Telescript.

Telescript is a communications-programming language that will enable any two Telescript-capable devices to exchange digital messages — text, graphics, sound, video — over wired (standard telephone) or wireless connections. It will be built in to personal information communicators (PICs) from General Magic and other hardware vendors; the PICs will run Magic Cap, a HyperCard-like cross between an operating system and a communications-application construction kit. Users will also be able to license Telescript as a system extension for Macs, DOS/Windows, UNIX, PenPoint, and other computing platforms. AT&T will offer a low-cost messaging service based on Telescript that could make sending messages as ubiquitous and as commonplace as talking on the phone. Look for news about pricing and shipping dates this summer.

— By Henry Bortman

Key Apple VP Goes to Microsoft

CUPERTINO, CA — Just three days before he was scheduled to deliver an opening speech at the Macworld Expo in San Francisco, Apple senior VP Roger Heinen surprised many by announcing he had resigned from managing Apple's Macintosh Software Architecture Division (MSAD) to take a job at Microsoft — as VP of database and development tools. During his three years at Apple, Heinen oversaw such important Mac-software developments as System 7 and QuickTime. Reacting quickly, Apple announced a week later that Dr. David C. Nagel, senior VP of Apple's Advanced Technology Group (ATG), would take over the management of MSAD and would also serve as acting head of ATG until a successor could be appointed.

More RAM in New LaserWriter . . .

CUPERTINO, CA — Yet another turnaround: In a last-minute configuration change, Apple boosted the standard RAM in the new LaserWriter Pro 600 printer from 4 to 8 megabytes, too late for us to change our description in the March issue. Apple also added PhotoGrade to the standard configuration, making the Pro 600 virtually identical to the Pro 630, except that it has no SCSI port or Ethernet option.

. . . And Lower Prices on Old Ones

CUPERTINO, CA — Apple's not forgetting its older LaserWriters as it lowers prices on the new ones — it's lowering prices 17 to 41 percent on selected LaserWriter models and on the Apple OneScanner as well. Reductions in suggested retail prices are as follows: 41 percent for the LaserWriter IIg ($3,909 to $2,309), 38 percent for the IIf ($2,999 to $1,869), 17 percent for the Personal LaserWriter NTR ($1,989 to $1,649), and 19 percent for the OneScanner ($1,179 to $949).

— By Karen J. Ohlson

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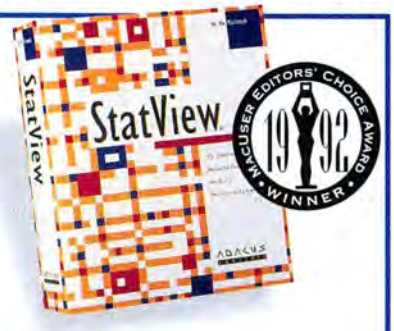
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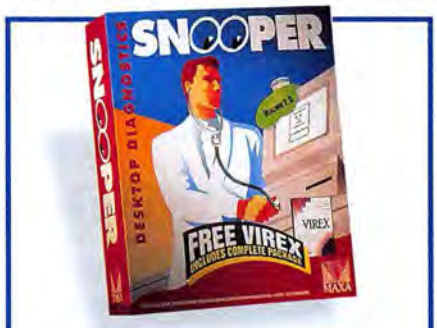


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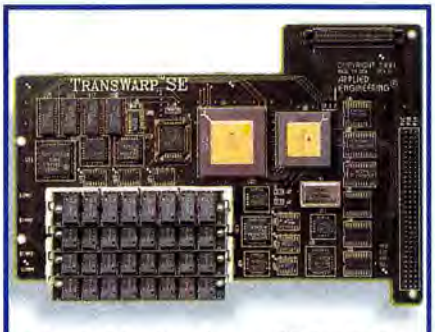
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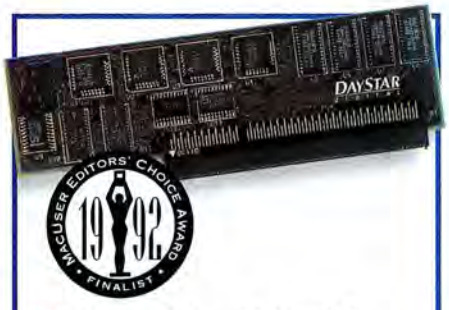
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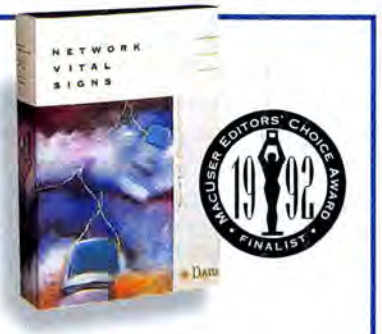
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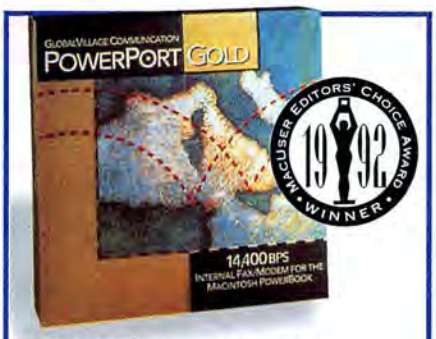
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OUTPUT DEVICES

HP PaintJet XL300 and Lexmark IBM Color Jetprinter PS 4079

HP's inkjet printer outclasses Lexmark's for affordable PostScript color output.

Low-cost color inkjet printers are no longer hot news, but PostScript-compatible color inkjet printers are another story. Two recent introductions, Hewlett-Packard's PaintJet XL300 and Lexmark's IBM Color Jetprinter PS 4079, are newsworthy because of the output quality they deliver for the price. Both printers offer multiplatform-network support, and as shared resources, they don't seem so terribly pricey. Each uses an inkjet mechanism to place color on pages. But the similarities end there. With its vibrant, saturated colors, even on plain paper, the XL300's output easily bests the Jetprinter's.

HP PaintJet XL300
Manufactured by: Hewlett-Packard Co., P.O. Box 58059, MS511L-SJ, Santa Clara, CA 95051; 800-752-0900 or 208-323-2551.
List Price: $4,995; $3,495 without PostScript.

Lexmark IBM Color Jetprinter PS 4079
Manufactured by: Lexmark International, 740 New Circle Road N.W., Lexington, KY 40511; 800-358-5835 or 506-232-2000.
List Price: $3,995.

PaintJet XL300

HP's 300-dpi PaintJet XL300 is a gem of a PostScript printer. In addition to support for true Adobe PostScript Level 2, the $4,995 printer provides LaserJet IIISi compatibility (including PCL 5 support) and multiplatform-network support that includes automatic switching between printer languages. The printer is equipped with ports for Centronics and AppleTalk/RS-422 connections. It can also accommodate optional HP JetDirect network-interface cards for Novell NetWare, LAN Manager, TCP/IP, EtherTalk, or HP-IB.

The XL300 easily juggles a variety of paper sizes, including legal and tabloid. An optional tray is available for tabloid-sized pages; you can also load pages manually. The printer also prints transparencies. HP recommends that you do not print envelopes and labels, because they may damage the printer mechanism.

Setup is a snap. An installer places the appropriate files in your System Folder. Once you've connected the printer to your Mac, you set a DIP switch for AppleTalk mode and you're ready to print. The whole process takes about 15 minutes. The HP Chooser-level driver lets you control the printer from your Mac, so you rarely have to fiddle with the controls on the printer itself.

The XL300 uses four ink cartridges: cyan, magenta, yellow, and black. Replacements sell for $21.95 (black) and $24.95 (color). HP rates cartridges at about 320 pages apiece at 15-percent density. Out of the box, the XL300 comes equipped with 6 megabytes of RAM. An Intel 80960 RISC processor significantly boosts the printer's performance.



The PostScript-compatible PaintJet XL300 (left), from Hewlett-Packard, sets a new standard for color inkjet output. The IBM Color Jetprinter PS 4079 (right), from Lexmark, has a lower price but can't match the XL300's output quality.

IBM Color Jetprinter PS 4079

Priced at $3,995, Lexmark's 360-dpi IBM Color Jetprinter PS 4079 is equipped with Centronics, RS-232, and AppleTalk connections. You can connect the printer directly to LAN Manager, OS/2, AIX, and Novell NetWare networks. Designed for multiplatform environments, the Jetprinter comes with printer drivers for PCs running Windows and for Macs. The Jetprinter features HP-GL plotter and PostScript Level 1 emulation (not true Adobe PostScript) with automatic switching between languages.

The Jetprinter accepts media in a variety of sizes and types, including tabloid-sized paper, envelopes, and

transparencies. A nice design feature is the location of the printer's paper tray; instead of jutting out from the front, it's conveniently located on top of the printer.

Installation is straightforward: An installer places the driver and related files in their correct locations. As with the XL300, you can control most printing options from your Mac through the Jetprinter driver's dialog box. The dialog box includes print-quality options (High Quality, Quality, Draft) that seem odd for a "PostScript" printer until you realize that they refer to the way the printer applies inks to a page and not to resolution. For example, High Quality mode forces the printer to pause for eight seconds at the end of every pass. In theory, this reduces ink smearing and bleeding on poor-quality paper. We were unable to discern any difference in output quality, but we did note that in High Quality mode, printing speed was measurably degraded.

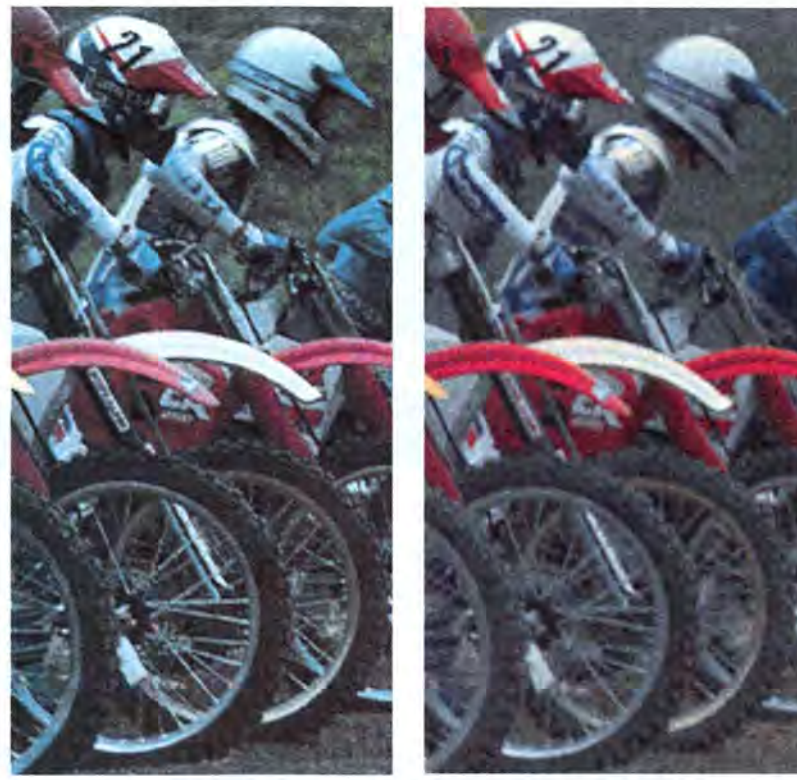
Like the XL300, the Jetprinter uses four ink cartridges. Its cartridges are more expensive than the HP variety — $24.95 for black and $34.75 each for cyan, magenta, and yellow — and are rated at 205 pages at 15-percent density.

The Jetprinter comes with 4 megabytes of RAM (upgradable to 16 megabytes) and is powered by a 16-megahertz AMD 29200 RISC processor. Lexmark offers a unique on-site one-year warranty for its printer.

To test the speed and print quality of the two printers, we connected them to a Mac IIci with 5 megabytes of RAM. The XL300 was equipped with its standard 6 megabytes of RAM and the Jetprinter with 4 megabytes. You'll want additional RAM for either printer if you plan to print full-page graphics on paper larger than standard letter-sized sheets.

We put both printers through a series of MacUser Labs tests. To test processing speed, we used a composite PageMaker document composed of a gray-scale TIFF image, type in various point sizes, gray ramps, and QuickDraw graphics. To test color fidelity, we used a 256-color TIFF file. A ten-page Microsoft Word text file rounded out the series.

For the composite-page printing, we found the XL300 to be a tad faster than the Jetprinter (30 minutes versus 31). It also did a better job at printing the hairlines on both the QuickDraw graphic and the gray-scale TIFF image. The Jetprinter's gray ramps boasted smoother transitions than the XL300's, however, and the Jetprinter's text output was sharper, especially at smaller point sizes.



Compared with output from the Lexmark IBM Color Jetprinter PS 4079 (right), output from the HP PaintJet XL300 (left) is sharper and the colors more saturated.

But the true test of the two printers is in the quality of their color output, and here the XL300 clearly comes out on top. Its innovative inkjet technology produces some of the best output we've seen from an inkjet printer. In addition, by heating the paper after the inks have been applied, the XL300 eliminates the paper wrinkles that have characterized inkjet output to date.

Although the Jetprinter was faster than the XL300 at processing full-page color documents (14 minutes versus 11 minutes for our test document), we were disappointed by the washed-out appearance of the colors.

The results of our test with the ten-page text document underscore the fact that you would never rate these printers in pages per minute — minutes per page would be more like it, considering that the XL300 required more than 27 minutes and the Jetprinter more than 17 minutes to print our text document. Neither printer should be considered for all-purpose printing in an office.

Although it's easy to like the XL300's output, the printer's design leaves room for improvement. Its unusual shape (30 x 20 x 10 inches) means that it takes up a substantial amount of desktop space, and the printer is quite noisy. The Jetprinter, on the other hand, is nice and small (20.5 x 16 x 6.7 inches), so it's a good fit in offices with limited space.

The Bottom Line

At $4,995, HP's PaintJet XL300 is somewhat pricey, but as a shared network resource, it makes an excellent color-output tool. Its only drawback is its cumbersome size. By contrast, Lexmark's IBM Jetprinter PS 4079 has a pleasantly compact design, and because it uses PostScript emulation, it costs about $1,000 less than the XL300. However, the XL300's color-output quality is so superior to the Jetprinter's that the XL300 is well worth the extra money. Overall, we recommend paying the premium price for a premium printer.

— Gregory Wasson

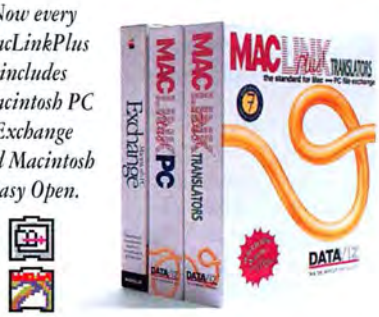


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VIDEO

VideoFusion

Eddy Award winner VideoFusion creates dazzling QuickTime-movie effects.

VideoFusion 1.0
Published by:
VideoFusion Ltd.,
1722 Indian Wood
Circle, Suite H,
Maumee, OH 43537;
419-891-9767.
List Price: $649.

Boasting a powerful array of special-effects filters and interchannel operations, VideoFusion is making some big waves among the QuickTime-moviemaking set. Unlike Adobe Premiere and DiVA's VideoShop, which specialize in digital-video-editing tools, VideoFusion has a treasure trove of splashy video effects.

Time-Based Image Processing

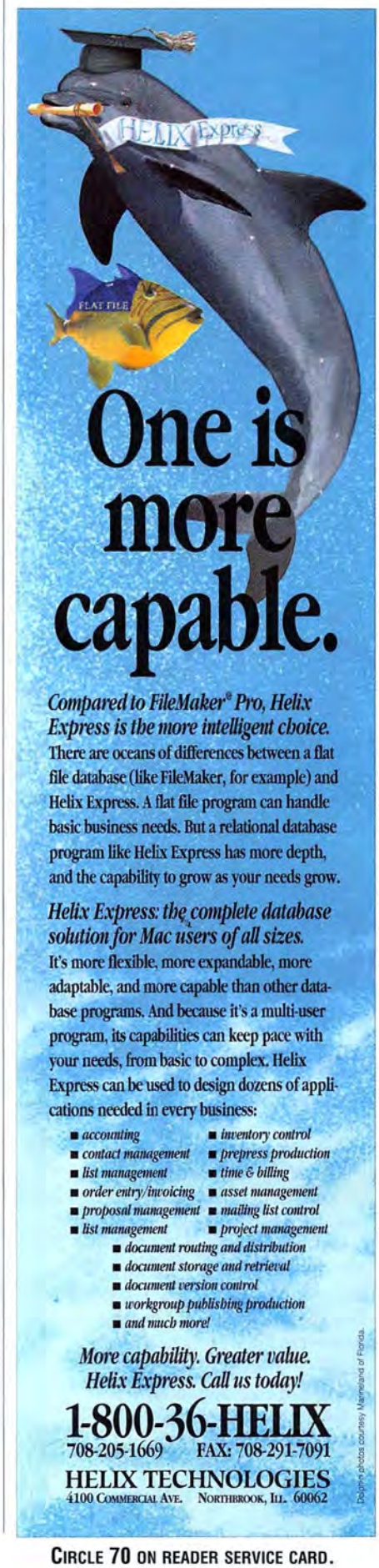
The special effects you can create with VideoFusion are difficult or impossible to create with other QuickTime-based programs. The program works its visual magic by combining video with time-based digital-image-processing controls. Tweening is also central to VideoFusion's success, because it eliminates the need to work with each individual frame in a movie or clip to create an effect. Instead you simply set different parameters for the start and end frames of the selection, and the program automatically interpolates the intermediate values, frame by frame. By giving you direct access to color-channel information, VideoFusion allows you to create an almost unlimited variety of effects.

VideoFusion's well-designed, intuitive interface simplifies the complex process of effects creation and makes the program accessible to QuickTime moviemakers of all levels.

The program's tools are best used in conjunction with a video-editing program such as Premiere or VideoShop.



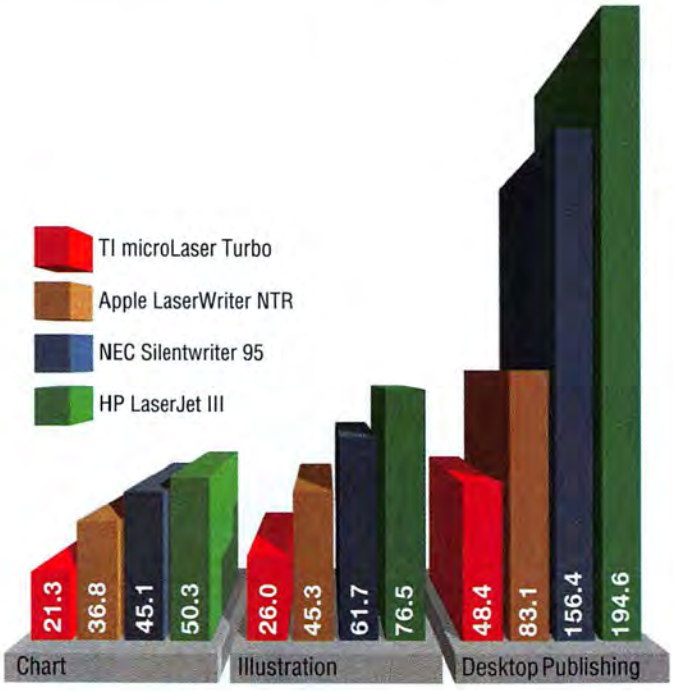
VideoFusion brings powerful special-effects capabilities to QuickTime moviemakers. Its well-designed interface gives you three ways to view and organize your movies as you apply sophisticated image-processing techniques such as morphing and compositing.



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VideoFusion's intuitive Pan Zoom Rotate control panel lets you manipulate the position of a video plane in three dimensions, making the movie seem to spin on an axis or move along a path as it plays.

VideoFusion does include a variety of basic editing tools, but they're no match for the powerful, versatile ones of dedicated video-editing programs. Moreover, the editing process isn't nearly as intuitive or flexible in VideoFusion as it is in Premiere, for example.

To begin creating effects, you can import media files in QuickTime, PICS, or PICT formats. VideoFusion even lets you import a sequence of PICT files and transform them into a QuickTime movie. You can export movies in the program's Raw file format, import them into Adobe Photoshop or another painting program, and paint directly on individual frames — a process called rotoscoping.

A Room with Three Views

You work with your movies in three main views: Storyboard lets you organize and manage your collection of movie clips; Player provides controls for viewing movies; and Time displays your movie in linear time for precise, frame-accurate video and sound editing.

VideoFusion's special-effects tools are divided among three main menus: The Combine menu provides options for creating effects by overlapping movies and channels, the Color menu provides commands for remapping and distorting colors, and the Filter menu includes motion-control effects and image filters. Many of the special-effects settings you create can be saved as templates and applied to other movies.

The Combine menu has standard transitions, such as wipes and fades between movies as well as more interesting features such as the Blend, Chroma Key, and Composite commands. The Composite command in VideoFusion works exactly like its counterpart in Photoshop — you can overlay a foreground movie on a background movie with a third movie acting as a matte. VideoFusion gives you excellent controls for blending and mixing as you superimpose one movie over another. And thanks to the time-based nature of the program, it's simple to create intricate, smooth cross-fades between movies.

Advanced Effects

With the Combine menu's interchannel math commands, you can create a variety of advanced effects. These commands provide powerful controls for creating and modifying stationary and traveling mattes from QuickTime movies. (In motion-picture production, traveling mattes are used to isolate a moving object, such as a detailed model spaceship, for placement against complex, separately shot backgrounds.)

With the program's Multiply and Superimpose commands, you can combine multiple traveling mattes in ways that no other QuickTime program allows. For truly psychedelic effects, you can use the Difference command to create unusual composites.

VideoFusion has built-in morphing. However, unlike Gryphon Software's Morph, which creates a QuickTime morph between still images, VideoFusion lets you create a morph between two movies. To do so, you set parameters that track morphing points from key frame to key frame. The technique is time-consuming, but the payoff is big — properly designed dynamic morphs were a big part of *Terminator II*'s success.

To create motion effects, VideoFusion's flexible controls let you zoom



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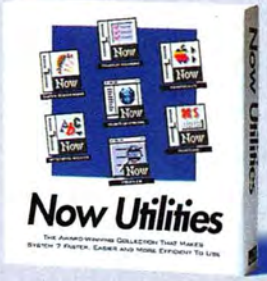
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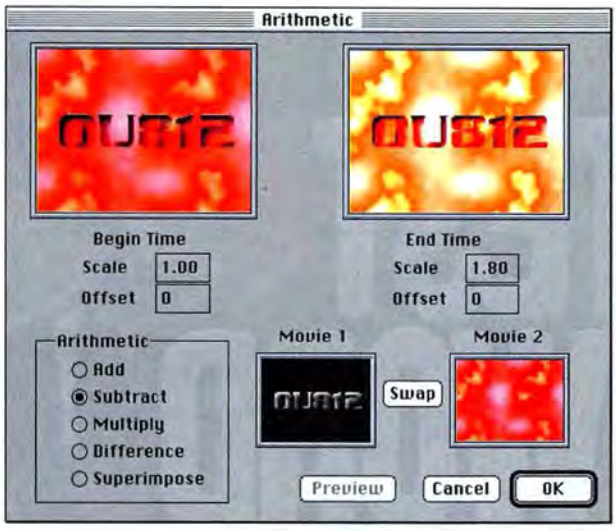
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VideoFusion's Arithmetic command lets you create advanced effects. The type in this example was created by subtracting a mask from a colored background.

in and around movies, changing the position of the video plane in three dimensions. A well-designed control panel makes it easy to dynamically change the perspective, position, and orientation of movies so they appear to fly in 3-D as they play. Once you've set motion-control parameters, VideoFusion lets you quickly preview the effect, prior to rendering, as a wire-frame animation.

Filter This

By applying a wide variety of filters to movies, you can create even more effects. The program's custom convolution matrix lets you design your own motion-filter effects, including blurring, sharpening, and embossing. The program also supports color-enhanced edges, palette remapping, tinting, color cycling, color correction, pixel erosion and dilation, posterization, warping, and channel extraction and replacement. If you've experienced the rush of creativity that Photoshop inspires with still images, be prepared for the same experience when you use VideoFusion with QuickTime movies.

VideoFusion's features and interface are outstanding, but we were disappointed that the documentation didn't follow suit. Although it explains all the basic functions, it lacks practical examples, which would be particularly helpful given the ground-breaking nature of this program. For example, the powerful interchannel Arithmetic and Logical commands are explained briefly, but helpful tips and examples are missing.

Another disappointment is that you must apply every VideoFusion effect to a movie separately, which takes a heavy toll in processing time, especially when you're working with complex filters. Premiere takes a better approach by allowing simultaneous application of multiple filters to a movie. In addition, VideoFusion's excellent motion-control effects are somewhat compromised by the program's inability to work with more than just the start and end key frames. With support for multiple key frames, VideoFusion would allow users to quickly create more-complex motion effects.

VideoFusion is slow at processing. This is hardly surprising, given the complexity of the effects you can create and the system-intensive nature of QuickTime-movie processing in general. If ever there were a program that could benefit from a hook into a DSP (digital signal processing) board (Photoshop notwithstanding), it's VideoFusion.

The Bottom Line

Although VideoFusion is as expensive as a full-fledged digital-video-editing program, it offers an impressive feature set for special-effects creation that can't be found in any other QuickTime-based program. It does an especially good job of simplifying the complex process of applying Photoshop-like operations to video over time. Overall, the dynamic filters and interchannel math commands it applies to digital image processing make it a must-have for advanced QuickTime users.

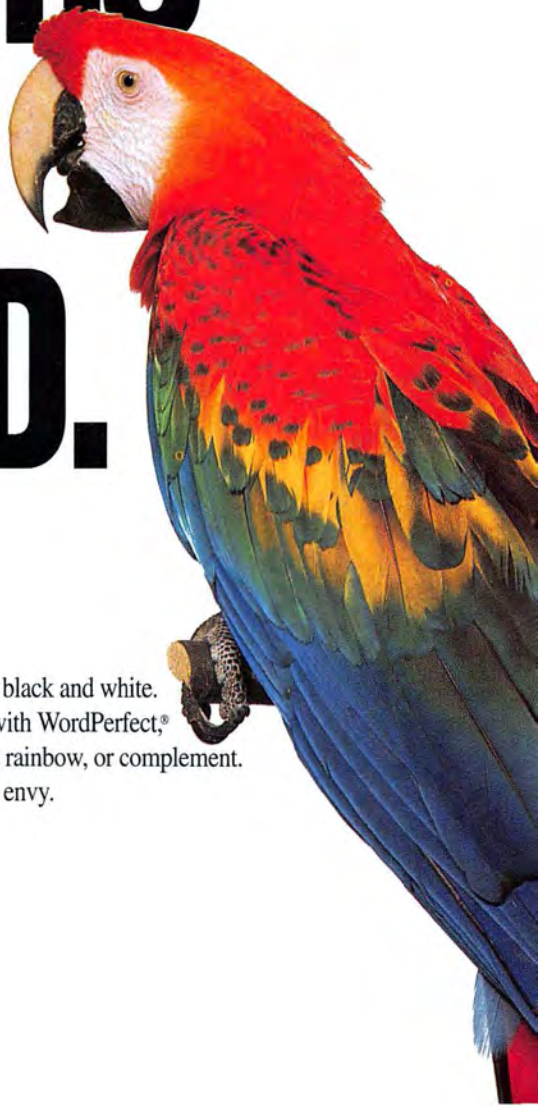
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Published by: Microsoft Corp., One Microsoft Way, Redmond, WA 98052; (206) 882-8080.
List Price: $495.

The latest release of Microsoft's ubiquitous word processor is not your standard incremental upgrade. Word 5.1 boasts a slew of handy, timesaving new features as well as a snappy new 3-D gray-scale look. But the best news of all is the upgrade's price — if you're a registered Word 5.0 user, you can step up to version 5.1 for only $14.95.

Wordsmith Tools

Word 5.1's handiest new feature is the Toolbar, which can hold as many as 30 buttons for quick access to commonly used commands. You can assign almost any Word command to a button, but you can save only one custom configuration of the Toolbar. You can choose from among 150 included icons to customize the Toolbar. Microsoft leaves you somewhat at sea here, however — although the documentation states that many of the icons are designed to represent specific commands, it doesn't indicate what those commands are. You can turn the Toolbar off to reduce screen clutter.

If you frequently collaborate on documents, you'll welcome Word's new Annotation command. It places a nonprinting icon at the insertion point and then opens a window into which you can enter comments. Other users can read your comments by double-clicking on the embedded icon.

Word's new Create Envelope feature lets you enter an address in a dialog box and then print a perfect envelope. You can store commonly used addresses, and when you select one, Word automatically pastes it into envelope address fields. Word is still missing the ability to mail-merge with a data file and import and export addresses, however.

Word 4.0 and 5.0 made you use the paragraph-positioning commands if you wanted to create drop caps in your document — a somewhat kludgey approach. Word 5.1 automates the process with its Drop Cap command, which enlarges the first letter or word of a paragraph according to the number of lines you specify. You can choose to position drop caps either within a paragraph's indents or in the left margin.

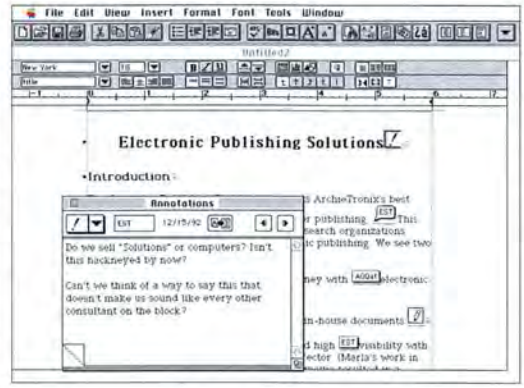
For creating documents that incorporate charts, Microsoft Graph, Word 5.1's new built-in charting application, is a real boon. To create a chart, you simply enter numbers in a Word table, select the numbers you want to graph, and click on a button in the ribbon, and Graph quickly creates a colorful 2-D or 3-D chart. Graph also works smoothly with numbers you subscribe to from Excel or other spreadsheet programs. Unfortunately, whether you subscribe to the numbers or enter them into a Word table, Graph does not automatically update charts when the numbers change.

In addition to major enhancements such as the Toolbar and Microsoft Graph, Word 5.1 provides several other handy amenities. To streamline table creation, for example, you can click on the new tables button on the ribbon and drag through a pop-up grid that lets you specify the number of rows and columns you want. The new Bullet command is convenient for inserting bullets and tabs at the beginning of selected paragraphs. And if you're printing two-sided documents, the new Word lets you opt to print odd or even pages. The Find File command now lets you limit searches to specific folders rather than forcing you to search an entire volume.

If you subscribe within Word to edition files published from other programs, the editions now appear with more of their original formatting intact. Excel-spreadsheet editions are particularly improved. And you'll no longer lose formatting changes when you update the published data.

PowerBook users will appreciate Word 5.1's PowerBook Install option for conserving disk space and RAM (it works mainly by leaving out Word's memory-hogging grammar checker). With the custom install, Word requires 2.2 megabytes of disk space (instead of the 6.5 megabytes required for a complete install) and 1 megabyte of RAM. When you've used the PowerBook Install option, the ruler displays a battery meter.

That's the good news about Word. The bad news is that the program continues to lag behind its Windows sibling. Word 5.1 for the Mac still lacks the scripting language and programmable fields that Word for Windows users have enjoyed for some time now.



Word 5.1 provides many more features than the standard incremental upgrade. Noteworthy are the new Toolbar and the Annotation command, which lets you embed notes within documents.

The Bottom Line

For $14.95, Word 5.1's new Toolbar, Annotation command, Drop Cap command, and built-in charting application give Word 5.0 users substantial improvements that make the upgrade a steal.

— Eric Taub

Lotus 1-2-3

Lotus' spreadsheet program scores high for usability but loses points for complex model integrity.

Lotus 1-2-3 1.1
Published by: Lotus Development Corp., 55 Cambridge Parkway, Cambridge, MA 02142; 617-577-8500.
List Price: $495.

Although the most recent release of Lotus 1-2-3 for Macintosh builds on the spreadsheet program's reputation for flexibility and usability, power users won't be trading in their copies of Microsoft Excel for Lotus 1-2-3 anytime soon. Version 1.1 of Lotus' spreadsheet program features drag-and-drop editing, among other welcome interface enhancements, as well as new charting options. However, if you frequently build large, complex spreadsheet models, Lotus 1-2-3's lax handling of model integrity may leave you in the lurch.

Sum-Savvy

One of Lotus 1-2-3's most impressive new features is the SmartSum command, which sums the rows and columns of a selected table with a single command. The SmartSum feature is even savvy enough to ignore blank cells, labels, and dates. Another welcome new feature is the ability to copy and paste across multiple cells with a single command.

Lotus 1-2-3's new drag-and-drop method for moving blocks of cells is similar to that pioneered in Excel. When you move the cursor to the edge of a selection, the pointer changes to a grabber that lets you drag the selection to a new location in the worksheet. What's different about Lotus' implementation, however, is that it allows you to drag and drop groups of cells across pages of a multipage, 3-D worksheet.

But moving cell contents is only half the job. We found that Lotus 1-2-3 is not as successful at enforcing model integrity with drag-and-drop as Excel is. For example, references in @SUM formulas based on cells that are later dragged and dropped to a new location don't update properly. In addition, Lotus 1-2-3 doesn't alert you that you're about to trash cell contents when you drag and drop a group of cells to a new location that already contains values or formulas. Lotus 1-2-3's lack of a worksheet auditor for error checking and structure evaluation exacerbates this problem.

Nimble Action

However, for those who don't need to construct large spreadsheet models, Lotus 1-2-3 is a capable performer that offers one advantage over Excel: crisp response. Because many Excel features are implemented as add-ins, users are often kept waiting while they load. Granted, several add-ins, such as the crosstab builder, offer features you don't get with Lotus 1-2-3. But the cumulative effect of the add-in approach is that Excel's performance is more sluggish than that of Lotus 1-2-3.

PowerBook spreadsheet jockeys may also prefer Lotus 1-2-3's in-cell editing abilities — you don't have to travel constantly to a formula bar to make changes, as you do in Excel — and smaller size. While not exactly svelte, Lotus 1-2-3 fully installed requires about 4 megabytes of disk space, compared with about 6 megabytes for a full installation of Excel. Moreover, Lotus 1-2-3 lets you minimize dialog boxes for more-efficient use of screen real estate.

New charting options in version 1.1 provide even more flexibility for creating eye-catching presentation graphics than the previous version did. You can use graphics as chart backdrops or stack them to fill solid-bar graphs (stacks of cigarettes to illustrate smoking trends, for example). You can also resize text entries on a chart by simply dragging the selection's handles. To reveal the source data underlying a chart, you can drag the bottom edge of the chart frame upward.

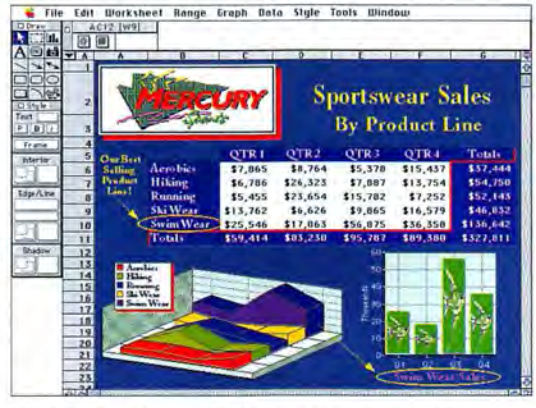
Lotus 1-2-3 now imports tab-delimited text files properly. When the program opens a text file, it creates a new worksheet by assigning values to columns, based on tab positions. A related feature lets you open a text file within an existing worksheet. Again the caveat is that you can inadvertently trash cells within the existing worksheet.

The Bottom Line

With version 1.1, Lotus has brought its spreadsheet program up to speed in several key areas. Most notable are the SmartSum command, drag-and-drop editing, and a command for copying and pasting across multiple cells. But it has dropped the ball when it comes to proper handling of large, complex spreadsheet models.

Overall, Lotus 1-2-3 offers several advantages over Microsoft Excel for users who don't need Excel's model-integrity vigilance. Lotus 1-2-3's snappier response, better charting tools, and efficient use of screen real estate make it a worthy tool for building and using simple worksheets, especially on PowerBooks.

— Louis E. Benjamin, Jr.



With the latest release of Lotus 1-2-3, you can enhance charts by using graphics in place of traditional chart elements and by adding images to chart backgrounds.

MODELING & ANIMATION

Infini-D

Infini-D gets a welcome boost in rendering quality and speed.

Specular International's versatile 3-D-modeling, -rendering, and -animation program, Infini-D, features some major improvements in its second release. Most significant are its rendering speed and quality. In addition, version 2.0 includes new QuickTime texture maps, enhanced output options, and better documentation.

With version 2.0, many aspects of Infini-D's rendering are significantly improved. First and foremost, the program's overall rendering speed is about 75 percent faster than that of the previous version. The most noticeable performance improvements are in Phong rendering and in ray tracing of imported DXF objects. In our tests, imported DXF models from Macromodel rendered about 500 percent faster in version 2.0. In addition, using Infini-D's sluggish terrain tool is no longer a study in patience — rendering speed for terrains can be as much as 1,000 percent faster with version 2.0.

Infini-D's Phong mode now supports shadows, and the Phong and Raytracing modes support anti-aliasing. You can choose from three levels of anti-aliasing — each higher level boosts image quality but increases the rendering time. Infini-D handles anti-aliasing on rendered images as a separate process and provides indicators to tell you what areas of an image are being smoothed — a very nice touch. Overall, the quality of Phong as well as ray-traced images is markedly improved with version 2.0.

Infini-D's new environment-map option makes shiny objects in scenes reflect textures — including textures that are built in to Infini-D or imported as PICT files. A new fog control creates the illusion of a dense atmosphere; objects in the background appear to be gradually enveloped by mist. The fog's color and density are adjustable. All things considered, Infini-D 2.0's rendering quality is almost as good as that of StrataVision, although its bump maps still can't match StrataVision's.

Infini-D 2.0
Published by: Specular International, 233 N. Pleasant Street, P.O. Box 888, Amherst, MA 01002; 413-549-7600.
List Price: $995.

Under System 7.0, Infini-D 2.0 can subscribe to EPS outline files published by other programs. So, for example, you can create curved shapes in Aldus FreeHand or Adobe Illustrator and subscribe to the published outlines from within Infini-D. To transform the outlines into 3-D, you import them into the program's extrusion and lathe workshops. When you edit disk-based published outlines from within the application used to create them, the corresponding 3-D shapes in Infini-D are automatically updated — a feature currently unavailable in any other 3-D-modeling program.

Version 2.0's new QuickTime feature lets you map QuickTime movies onto 3-D objects. Not only can you use the movies as color maps but you can also use them to create animated bump, transparency, and reflection maps. Infini-D's Surface Composer lets you precisely position QuickTime movies on surfaces.



This image showcases some of the enhancements to Infini-D's rendering capabilities, including environment maps, fog, and anti-aliasing.

Improvements to Composer in version 2.0 include support for numeric positioning values that make it much easier to align multiple overlaid textures and support for alpha channels for controlling texture-map transparency.

You can save animation files created with Infini-D as QuickTime movies. The program provides full access to all the standard QuickTime compression and quality options. Infini-D also provides full support for alpha channels with its still-image output. That means that you can import a rendered image into an image-processing program such as Adobe Photoshop and use alpha channels to composite the image seamlessly with different backgrounds. With this technique, you can create several reflection effects without the time-consuming process of ray tracing.

Infini-D 2.0 features a variety of smaller enhancements, including a new halogen-light switch for dramatically bright point lights and spotlights; improved support for DXF import; a long-overdue DXF-output capability; marquee selection in the animation sequencer for processing multiple events; and an improved reference manual that provides clearer descriptions, better tips, and a greater number of illustrated examples than the previous manual did.

The Bottom Line

Infini-D is an impressive update to an already fine product, enhancing the program's reputation as one of the best all-inclusive, affordable 3-D-design programs. Improved rendering quality and speed take Infini-D up the ladder to the next rung of 3-D power. Anyone who owns and uses Infini-D would be well advised to update to version 2.0. Newcomers to 3-D modeling will find Infini-D's interface to be one of the most accessible among 3-D programs and its tools to be well suited to all phases of 3-D design.

— David Biedny

Publish It! Easy

Timeworks' page-layout program continues to set the pace for affordable DTP.

If your word processor comes up short for DTP-related tasks but you don't need the clout of PageMaker or QuarkXPress, you're probably better off moving to a low-end DTP program than to a more powerful word processor. Timeworks' Publish It! Easy is one of the best and most versatile low-end programs you can find — it offers a serviceable slide maker, a mini database program, a word processor, and a painting and drawing program all in one package. Improvements in the latest release beef up the program's drawing tools and enhance several DTP features.

Enhancements to Publish It! Easy (PIE) include paragraph tags for fast text formatting, multiple horizontal and vertical ruler guides, a dialog box that automatically warns you if you try to print a document containing frames with unflowed text, the ability to print facing pages on a single 11-x-17-inch document, and enhanced image-editing controls. New drawing tools also help keep PIE ahead of its competitors.

PIE's closest rival, Aldus Personal Press, has included paragraph tags for some time, but PIE's implementation is better. If, for example, you've applied the same tag to all your subheads and you want to increase the point size, with PIE, you can simply edit the tag definition. Then all subheads adopt the new size whether you've created them before or after you changed the definition. Not so with Personal Press — any subheads you've tagged before you edit the tag definition do not automatically change. One fault these programs have in common is the lack of keyboard command equivalents for paragraph tags.

With PIE 3.0, Timeworks wisely focused on image controls. By and large, image controls in low-end DTP programs are more important than those in high-end programs, because most graphics professionals use a separate, high-powered program tailor-made for image editing. Users of low-end DTP programs are more likely to benefit from layout software that handles all DTP-related tasks, including image handling.

★★★★½

Publish It! Easy 3.0
Published by: Timeworks, Inc., 625 Academy Drive, Northbrook, IL 60062; 708-559-1300.
List Price: $199.95.

PIE's entry-level controls allow you to adjust the brightness and contrast of color and gray-scale TIFF and PICT2 images. It also supports posterization, negative images, and the individual adjustment of color layers. Although PIE's preview feature shows a distorted shape of the final image, its instant feedback is handy.

The new French-curve tool averages the angles of three consecutive line segments to produce a smooth, continuous curve. You can't edit the curves with control points, as you can in high-end drawing programs, but it's nonetheless a welcome addition. New drawing tools for grids, diamonds, arcs, and radial spokes are also welcome.

Version 3.0 lets you apply single-color, multiple-shade, graduated fills but only to rectangles. Although the on-screen display works properly only when your starting shade is set at 0%, printouts reflect any starting-shade setting.



Drawing tools as well as paragraph tags for fast and easy text formatting are welcome additions to Publish It! Easy 3.0.

Despite its enhancements, PIE is still not perfect. You can't remove a master item from a nonmaster page, and the program doesn't yet break the 100-page barrier. PIE also lacks Personal Press' ground-breaking AutoCreate feature as well as support for System 7's publish-and-subscribe.

We uncovered one bug in the new version as well. Menu items sometimes go berserk, growing larger or smaller, when you open a file immediately after closing an untitled, unsaved document. On request, Timeworks will send 3.0 users a fix. According to Timeworks, the fixed version, 3.01, became the shipping version at press time. Timeworks claims that 3.01 also fixes a minor glitch that pops up only on 68000 machines.

The Bottom Line

Publish It! Easy successfully targets those who need more DTP power from their word processors but don't want to spend the time or money on complex, high-end page-layout programs. This requires some tricky maneuvering — it's tough to stay ahead of the ever more powerful word processors and still retain ease of use and a price that undercuts that of the PageMakers and QuarkXPresses of the world.

With PIE 3.0, Timeworks builds nicely on its original strategy — to offer a plethora of attractive DTP, database-program, slide-making, word-processing, and painting and drawing features to wean people from their dependence on word processors; sell it at a rock-bottom $199.95; and rein in the hardware requirements to keep the higher-end programs at bay. As in many other free-market competitions, the consumer wins. Despite a few minor glitches, its enhancements and versatility make PIE a bargain.

— Shelley Cryan

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PERSONAL INFORMATION MANAGERS

ACT! and Shortlist

Shortlist counters ACT!'s splashy interface with an impressive feature set for contact management.

With the introduction of Apple's PowerBooks, contact management on the Macintosh has suddenly become a high-profile software category. Adding more heat to an already hot contest, Contact Software International's ACT! and Brainchild's Shortlist each bring a mix of benefits and drawbacks to the process of managing contacts. ACT! wins for handsome interface design, whereas Shortlist provides more bang for the buck.

ACT! 1.0
Published by: Contact Software International, 1840 Hutton Drive/ #200, Carrollton, TX 75006; 800-365-0606 or 214-919-9500.
List Price: $395.

Shortlist 1.0.1
Published by: Brainchild Corp., 547 Pepper Ridge Road, Cincinnati, OH 45244; 513-831-8451.
List Price: $149.

ACT!

ACT! for the Macintosh is the long-awaited counterpart to Contact Software's popular DOS and Windows packages. The program combines a Rolodex-style database (name, address, phone number, and notes) with calendar and reminder software and an integrated word processor for letter writing and mail-merge. Automatic phone dialing is also supported. On the surface, ACT! is one slick-looking program — its colorful icon bar and input screens are gorgeous.

ACT!'s main screen is similar to FileMaker Pro's. Card icons let you flip through individual records. You can navigate through listings alphabetically or go to the first and last record in a selected group.

Data input is straightforward; you simply click on a field and enter information. All fields are completely customizable. You can choose field labels and data type (text, date, phone number, and currency, for example) as well as add pop-up pick lists to each field. The program's use of pick lists rather than pop-up menus, check boxes, and radio buttons belies its DOS roots.

ACT!'s customizable icon bar provides quick access to a variety of common functions, including calendar view selection, event scheduling, note entering, and letter writing.

For event scheduling, you can select from three types of activities — phone calls, meetings, and to-do items — and set alarms to notify you of upcoming events. You can display and print your calendars in month, week, or day views.

For letter writing, ACT!'s word processor automatically inserts a selected contact's name and address at the beginning of the letter and your name on the signature line. The capable word processor's feature set is akin to MacWrite II's — a spelling checker is included.

The ACT! package includes several built-in reports (contact summaries, future activities, and so on) and also lets you create your own with its built-in report-template generator.

ACT! includes a timesaving macro function for automating repetitive tasks. For handy access, you can assign custom icons to macros and place them on the icon bar.

If you've been storing contact information in a database or spreadsheet, ACT!'s ability to import tab-delimited text files makes it easy to transfer your existing data to ACT!.

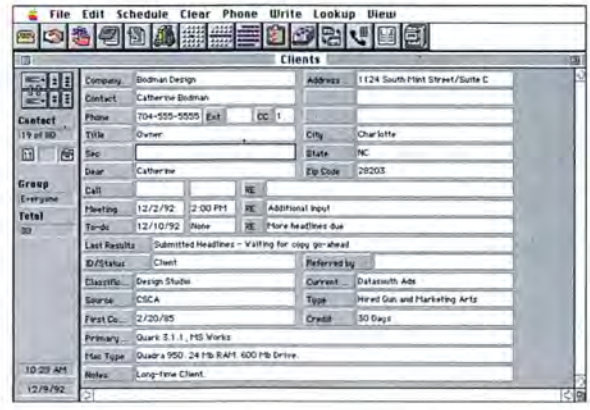
Another benefit is ACT!'s Apple-events link to the GeoQuery mapping program. Sales professionals who need to manage contacts organized into geographic sales territories will welcome this feature.

ACT! lacks multiuser capabilities, and at $395, it costs the same as Contact Ease and Control Classic, two other contact managers that provide some features ACT! lacks, such as event tracking and the ability to apply automated procedures to common tasks. However, with its ability to exchange files directly among Macintosh, DOS, and Windows versions, ACT! comes out on top for multiplatform support.

Shortlist

Although Shortlist's looks are not in the same league as ACT!'s, it makes up for its plain-Jane interface with a versatile and powerful feature set and modest $149 price.

Like ACT!, Shortlist combines a contact-information database, automatic phone dialing, scheduling and reminder



ACT! for the Macintosh is pricey but features a colorful, icon-oriented interface and numerous customizable fields for managing contacts.

MacLand Inc.

Software

Retail Price **Our Price**

BUSINESS AND PRESENTATION

Accountant, Inc. Softsync	$595	**$329**
ACT! Contact Software	$395	**$239**
Address Book Plus 2.0 Power Up !	$99	**$62**
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SoftPC 2.5-Universal Insignia Solutions	$325	**$189**
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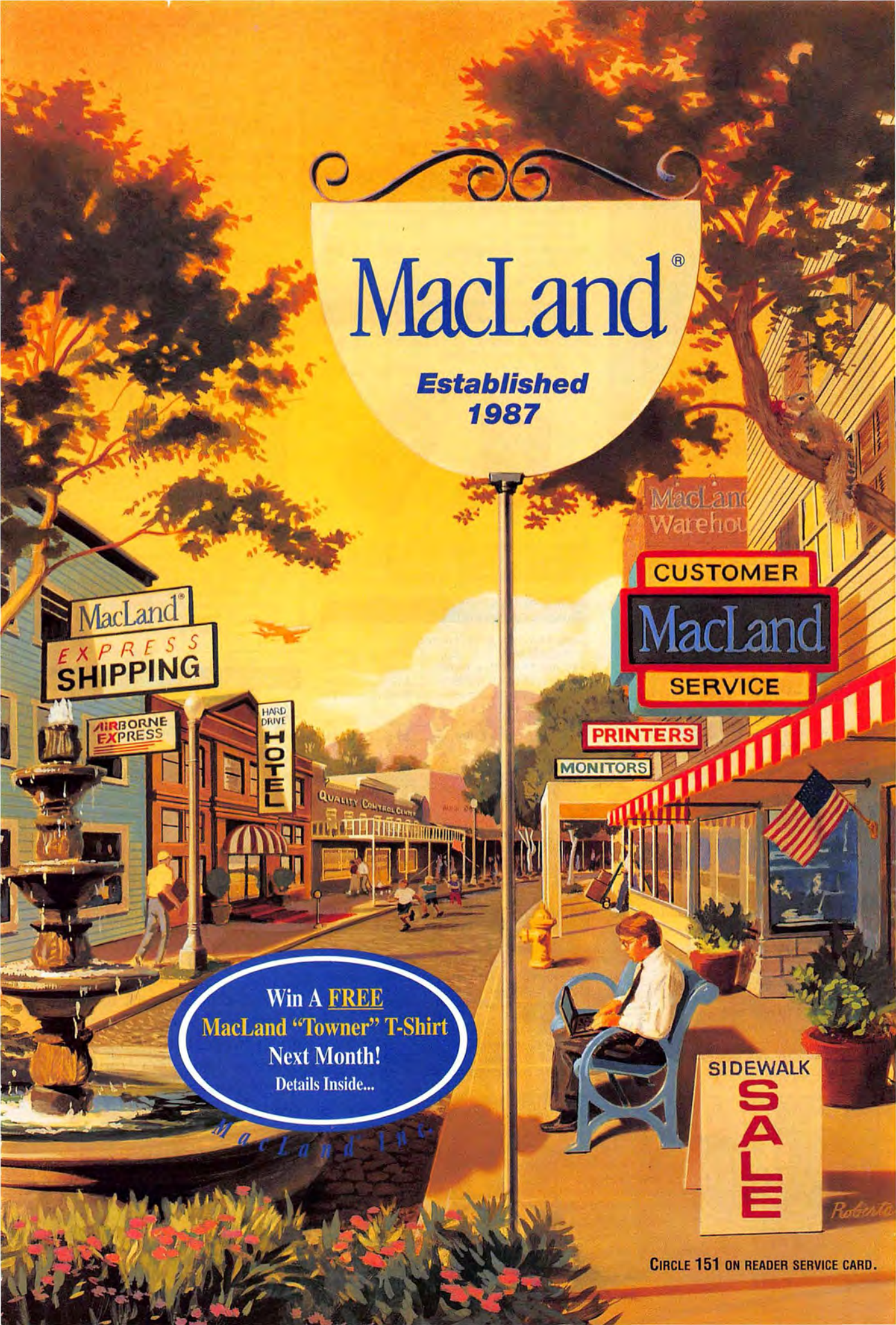
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85MB	$282	**$229**
105MB	$335	**$279**
120MB	$355	**$309**
127MB	$375	**$309**
170MB	$405	**$339**
240MB	$621	**$469**
425MB	$1,114	**$899**
EXTERNAL		
42MB	$312	**$259**
85MB	$352	**$289**
105MB	$395	**$339**
120MB	$415	**$369**
127MB	$435	**$369**
170MB	$455	**$399**
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INTERNAL*		
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1 GIG	$1,889	**$1,499**
1.2 GIG	$2,081	**$1,599**
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525 MB	$1,337	**$1,079**
700 MB	$1,689	**$1,359**
1 GIG	$1,989	**$1,599**
1.2 GIG	$2,181	**$1,699**

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Singles	$99	**$64**
88 Megabyte Hard Drive	$699	**$449**
Cartridges:		
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5 Pak-ea.	$129	**$95**
Singles	$129	**$97**



All MacLand Drives are pre-tested, pre-formatted, and come complete with our own installation and reference manual, DiskMaster Plus™ formatting and utility software, cables and two-year warranty. Internal hard drives also include bracket kits to fit your particular Mac.

88c Megabyte Hard Drives $549

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* The 44 megabyte cartridge will need to be pre-formatted by a 44 megabyte drive in order to operate in the 88c drive. MacLand is offering these pre-formatted 44 megabyte cartridges exclusively for **only $69** per cartridge!

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NEC CDR-74 Gallery	$999	**CALL**

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TI PS35 MicroLaser Turbo	$1,799	**$1,599**
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NEC SilentWriter 2 Model 95	$1,749	**CALL**
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Dataproducts LZR 1560	$4,495	**$2,995**
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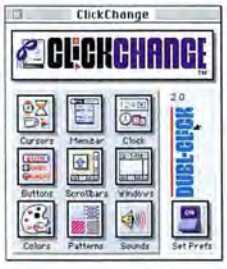
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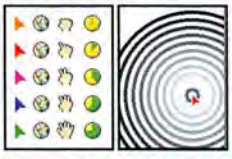
"What this country needs is a change..."

ClickChange 2.0

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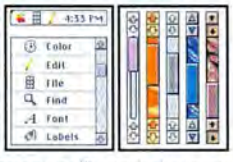
Personalize your Mac with ClickChange 2.0. Replace drab old cursors and menu titles with exciting, animated, color alternatives. Custom color schemes, scrollbar and desk patterns accompany your choice of button, window, and scrollbar styles. Your Mac comes alive, responding with sounds when you choose.

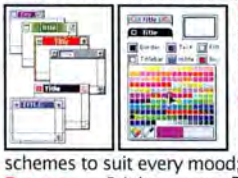




Cursors. Replace those 5 boring standards with color, animated cursors— even create and edit your own! **CursorFinders.** Ever lose your cursor? Type a key and one of our flashy graphics exposes bashful cursors.

Menubar Icons & Clock. Space at a premium? Our compact menu icons and clock won't cramp your style. **Buttons & Scrollbars.** Tired of those flat 50's looking controls? Slip into one of our sleek, modern, 3D designs. If you've got a big screen, you'll wonder how you survived without our "dubl-arrow" scrollbars.





Windows. The perfect frame to display those fancy new buttons and scrollbars in. Lots of cool styles! **Colors.** Colorize windows, menus, buttons, scrollbars and more. Save color schemes to suit every mood; many already included.

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Hey, MacUser dug it. ClickChange 1.0 was rated 4.5 mice. **Requires:** a MacPlus or newer, System 6 or 7, and a sense of humor. $89.95.

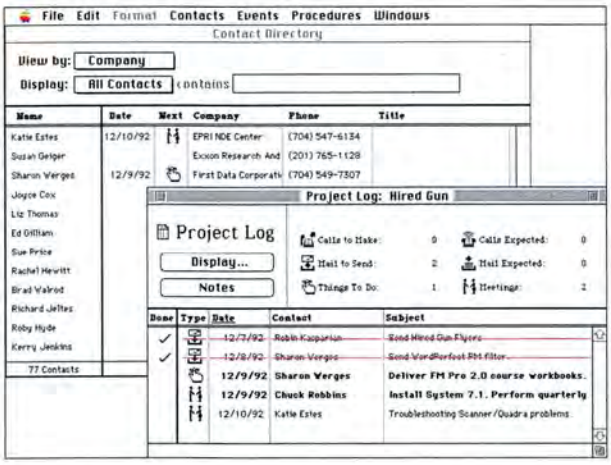
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CIRCLE 97 ON READER SERVICE CARD.



Shortlist's interface is rather primitive, but the program is a good tool for organizing activities that involve different contact lists.

features, and integrated word processing. It also supports automated procedures. Despite its more robust feature set, Shortlist requires significantly less disk and RAM space than ACT! does — a decided advantage for users of PowerBooks and low-end Macs.

Shortlist's approach to contact management is based on Projects. A Project is a document that contains all the contacts, events, and procedures that relate to a specific activity, such as a trade show or a product introduction. Initially, we found the Project approach a bit awkward to get used to, but once mastered, it provides a unique and powerful way to organize a variety of activities involving different people.

Shortlist's contact-information screen is lean and mean, providing space for only the essentials — your contact's name, title, company, address, four phone numbers (including fax), and salutation information for letter writing. A Notes button gives you access to a note-taking window, and a Copy From button lets you copy information from one contact record to another.

To schedule events, you select a contact or a group of contacts from a directory window and choose New Event from the Events menu. Events are divided into several categories — Calls to Make, Calls Expected, Mail to Send, Mail Expected, Meetings, and Things To Do — that give you more options than ACT!, Contact Ease, or Control Classic provide.

You can view scheduled and completed events in Shortlist's Project Log window, which automatically appears when a project is opened, letting you quickly gauge the project's status. You can also view the events scheduled for any number of days in a Schedule Summary window or opt to view daily events in Gantt-chart format.

Like more-expensive contact-management programs such as Control Classic, Shortlist lets you automate repetitive, multistep tasks, such as sales-lead follow-up procedures, and invoke them with a single command.

Shortlist's word processor is a bit barebones, but it does provide enough functionality for simple letter writing and mail-merge.

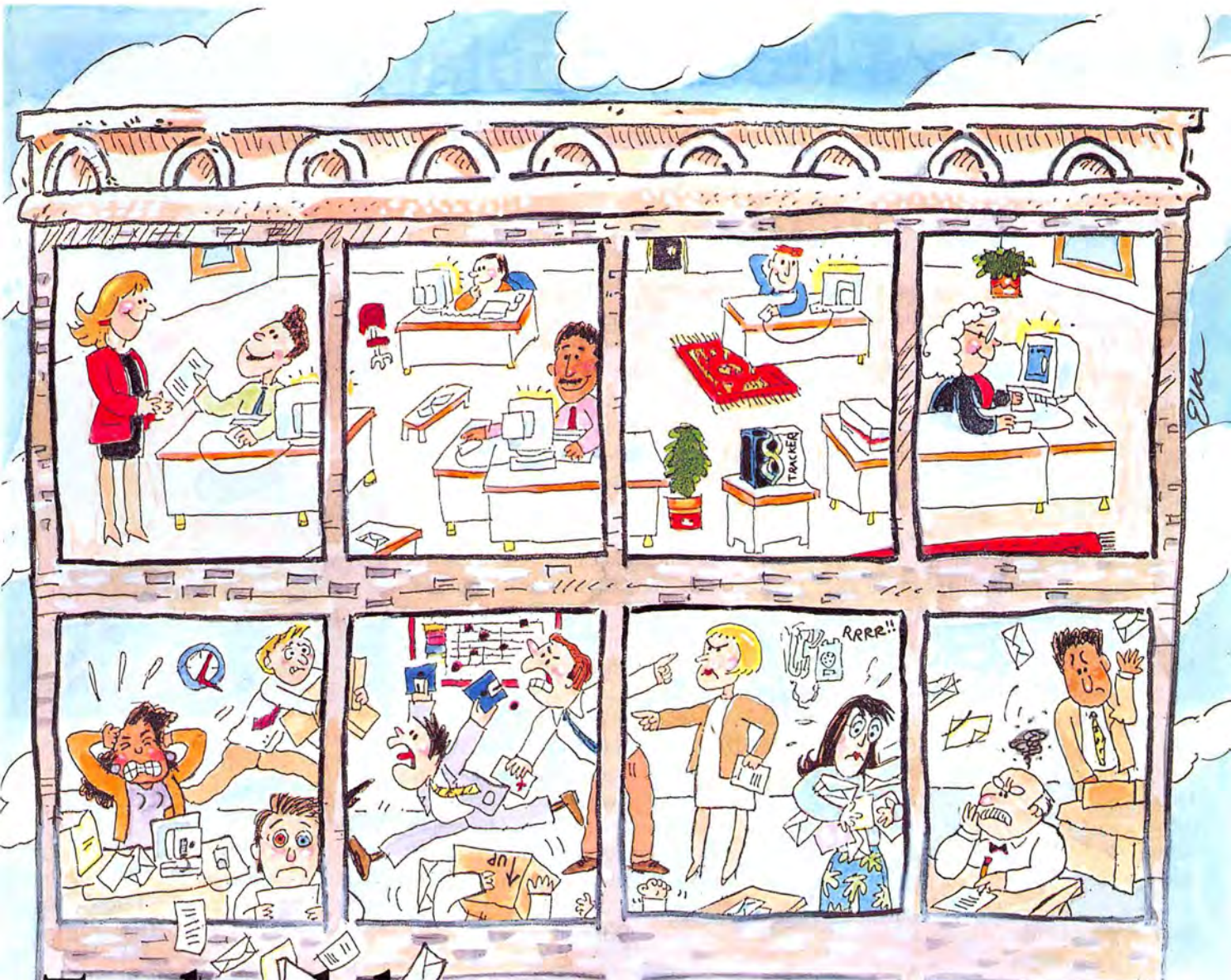
The program's manual is a scant 154 pages, most of which is devoted to a helpful tutorial. And Shortlist does take advantage of Balloon Help.

Overall, Shortlist provides an impressive feature set for the price, but there are some sacrifices. It lacks an alarm feature, the number of fields it provides is limited, and you can't customize fields. For what it offers, however, Shortlist is a true contact-management bargain.

The Bottom Line

The race to satisfy the legions of PowerBook users clamoring for versatile, easy-to-use contact managers is underway. ACT! and Shortlist bring solid features to the contest. If you need multiplatform support and customizable fields, ACT! is a good choice, although considering its price, its mediocre feature set is somewhat disappointing. Shortlist offers powerful project-handling features teamed with a blue-plate-special price, but its interface is rather primitive. Neither of these programs is perfect, but if you're constantly juggling contacts and appointments, each can help you avoid dropping the ball.

— Tom Petaccia



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DATABASE MANAGEMENT

Helix Express

Featuring improved speed and a new data type, Helix Express steps in where Double Helix left off.

If you thought Double Helix had gone down when its maker, Odesta, collapsed more than a year ago, think again. The relational-database program has reemerged with a new name and a new maker. Called Helix Express, from Helix Technologies, the program builds on its predecessor's reputation as the only relational-database program that mere mortals can hope to master. You don't have to be a trained programmer to build sophisticated applications with Helix Express. The new release features several welcome enhancements, including support for a powerful new data type and a network-server model that's speedier than the one Double Helix used. However, overall performance remains sluggish, and the program's closed architecture prevents it from working with other database applications.

Helix Express 1.0
Published by: Helix Technologies, 4100 Commercial Avenue, Northbrook, IL 60062; 708-205-1669.
List Price: $439.

BLOB Support

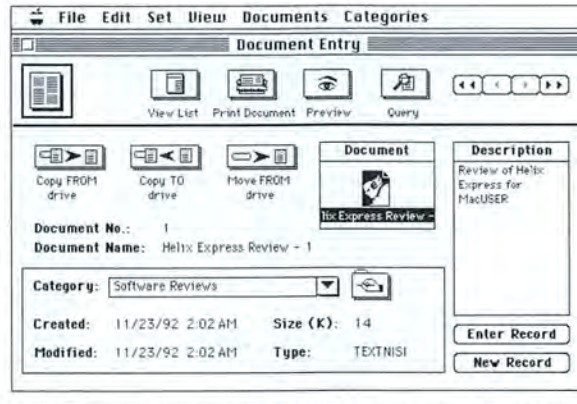
At $439, Helix Express is the most attractively priced relational-database program you can find. If you're already a Double Helix user, you can upgrade to Helix Express for $129. In a nutshell, the upgrade offers improved speed, support for both System 7 and Binary Large Object (BLOB) data fields, and several bug fixes.

Helix Express' BLOB support allows you to add a new data type, called Document, to Helix Express databases. This capability lets you stash virtually any desktop item — including files, folders, pictures, sounds, and QuickTime movies — in a database. You can further build upon BLOB support by creating sophisticated work-flow applications that can incorporate any type of Macintosh data.

On client machines, Helix Express stores pointers to Document files instead of storing the files themselves. To represent the files, the program displays icons with filenames attached. When you double-click on an icon, Helix Express copies the file from the server database, where it's stored, to your hard disk. The file then launches, provided you have the application that created it. When you're finished modifying the file, you can save it back to the Helix Express server or to your hard disk.

One at a Time

Helix Express Document files have a few restrictions. For example, you can open only one Document file at a time. In addition, you must store Document files internally in your database; you can't store them as linked external files, as you could with ODMS (Original Document Management System), developed by Odesta with Double Helix. Still, the BLOB technology is powerful and sets Helix Express apart from other relational-database programs.



Helix Express distinguishes itself from other relational-database programs with its ability to store binary document files in databases.

Helix Express also lets you customize the appearance of the applications you create. You can eliminate window-control elements such as scroll bars, title bars, and grow boxes; you can also modify borders and make some windows invisible. Version 1.0 of Helix Express also adds (finally!) keyboard command equivalents that conform to Mac standards.

Like Double Helix 3.5, Helix Express supports a stand-alone network server, which is supplied with the basic package (you also get a free test-client access node, but you must purchase fully functional clients at $129 to $199 each if you want to build a multiuser Helix Express network). Helix Express uses the ADSP (AppleTalk Data Stream Protocol) for client/server communications — a feature that makes it faster than Double Helix. However, performance remains a problem — Helix Express is still fairly slow, even on high-speed EtherTalk networks.

The package also provides Instant Visit, a feature that copies the basic structure of a Helix Express database from the server to a client machine's hard disk when a user logs on. Instant Visit contributes to improved performance by allowing the application to run more operations locally, rather than constantly accessing the server across the network. Server updates can occur when the client machine is idle.

Icon-Driven

Helix Express' core technology remains icon-driven. This has definite advantages for novices, but traditionally trained programmers may find the nonprocedural approach frustrating at first. However, for those who stick with it, Helix Express' approach can be rewarding. The program's flowchart-based, object-oriented programming feels much like a



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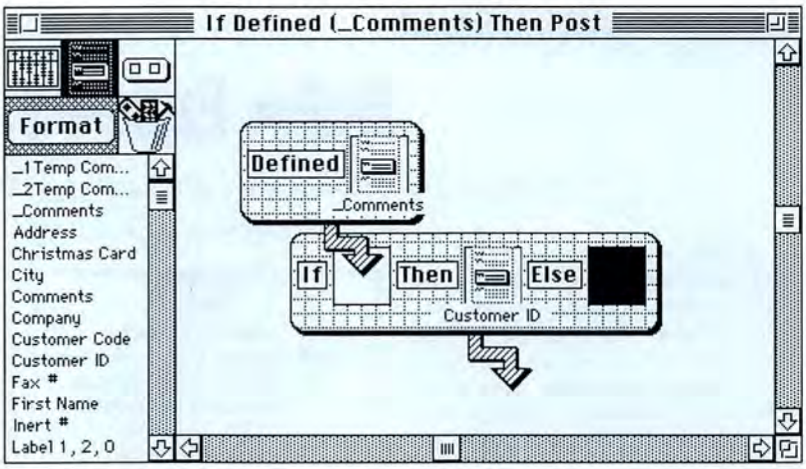
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With its iconic approach to programming, Helix Express is accessible to nonprogrammers. However, its icon selection is somewhat limited and its closed architecture prevents it from working with other database programs.

combination of TGS Systems' Prograph and Apple's MacApp.

When you double-click on a Helix icon, the program opens a window that lets you design a process, structure, or calculation. For example, Helix's Abacus icons and its calculation tiles represent data operations. An Abacus construction may use just one calculation tile for a simple arithmetic operation, or it may use connected groups of tiles to create sophisticated mathematical operations such as square root, absolute value, natural logarithms, and a variety of string functions.

Closed Architecture

The flip side of Helix Express' icon-oriented design, however, is its lack of extensibility. The program offers no formal programming interface or language. Furthermore, it doesn't make any provisions for the external use of other languages, libraries, routines, functions, or object sets. Some users, especially professional database programmers and managers who design applications that must work in concert with others, will find Helix Express' closed architecture a serious liability. Further confining Helix Express to its own object-oriented icon world is its lack of support for System 7's Apple events and publish-and-subscribe.

Helix Express provides more than 100 icon types, which represent built-in functions and commands. However, the functionality pales when compared with top-of-the-line relational-database programs such as 4th Dimension, from ACI US, and Blyth's Omnis Seven. Even when compared with those of Claris' flat-file-database program, FileMaker Pro, Helix Express' built-in functions seem a bit skimpy. For example, the program gives you only two calculation tiles for financial functions — annuity rate and compound rate. Even FileMaker Pro's built-in financial calculations include present value, current payment, net present value, and future value. If Helix Express is going to live by icons alone, it must extend its functionality by providing many more icons.

The Bottom Line

With the release of Helix Express, Helix Technologies has rescued a solid relational-database program from oblivion. Helix Express is the only such program that's accessible to users with no more programming experience than the occasional HyperCard-stack fiddling or QuickTime-movie making.

Moreover, with its newly added support for BLOB data fields coupled with a faster and more robust server, Helix Express is a good choice for those who want to develop multiuser applications but don't want to learn the idiosyncrasies of code-based relational-database systems. At a list price of $439, Helix Express is a true bargain, but several drawbacks remain. We'd like to see Helix Technologies work to enhance the program's network performance as well as extend its icon metaphor to work with external languages, libraries, routines, and objects.

— Don Crabb



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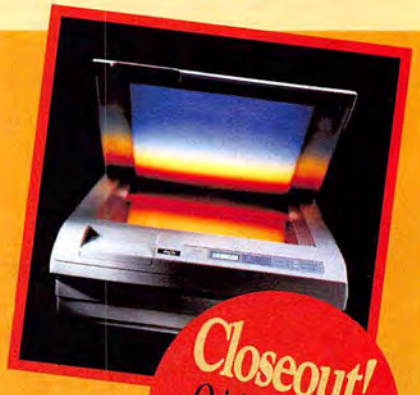
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PROJECT MANAGEMENT

MacProject Pro

A new outliner and cross-project tools keep Claris' project-management software in the race.

As the first project-management tool for the Mac, Claris' MacProject has dominated the market for quite a while. But there's no time for resting on laurels. With tough competition coming from Microsoft Project 3.0, Scitor's Project Scheduler 5, and Micro Planning International's Micro Planner Manager 1.02, MacProject is scrambling to hold its No. 1 position. With the latest release, MacProject Pro, Claris has added some powerful, long-overdue features while retaining the program's well-designed and easy-to-use interface.

MacProject Pro 1.0
Published by: Claris Corp., 5201 Patrick Henry Drive, Box 58168, Santa Clara, CA 95052; 408-727-8227.
List Price: $599.

Brainstorming Tools

Like the previous version, MacProject Pro is best suited for managing relatively well-defined projects. As with most other programs in its class, MacProject Pro's main focus is on tracking three project elements: tasks, time lines for completion, and resources. Key additions to the Pro version are an outliner, cross-project management tools, the ability to incorporate supplemental information into charts and reports, full System 7 support, and improved data-import and -export facilities.

Outline is MacProject Pro's most significant new feature. It gives you a place to jot down your ideas, so you can plan projects as well as manage them. Furthermore, it provides a much more flexible way to enter data than the table-based data-entry method of previous versions. As with outliners such as Acta and MORE, you can manipulate MacProject Pro outline entries in several ways: You can move items around, change their hierarchical orientation, collapse them, delete them, or expand them. The program automatically assigns legal-style-outline numbers to each outline entry, and the outliner can hold as many as 25 hierarchical entry levels.

Another key feature is MacProject Pro's ability to control several related projects. Not only can you track resources across several projects but you can also level them automatically or interactively. Only the physical limitations of your Mac (RAM, disk, and processor) limit the number of related projects you can manage. The same applies to the number of resources and tasks. To assist you in tracking resources, MacProject Pro includes resource-allocation tables and graphical displays such as resource time lines and histograms.

An important feature related to tracking and leveling resources across projects is management of ancillary project information. MacProject Pro lets you attach documents created by other Macintosh applications to project milestones, tasks, and summaries. When you double-click on an attached document, MacProject Pro launches the source application so you can edit the document. This feature lets you link blueprints, worksheets, reports, budgets, specs, and other information required to keep projects on time and under budget. One caveat: Be sure to store attached documents in the same folder as your project data, because MacProject Pro doesn't store the full directory information associated with attached documents. In addition to attaching documents, you can attach expandable notes to charts to highlight specific points as well as embed notes in outlines.



MacProject Pro boasts a new outliner that provides several advantages: It helps you plan projects as well as manage them, and it offers a more flexible data-entry vehicle than the tables of the previous version.

The data-import and -export capabilities of the previous version of MacProject were nothing to write home about, so we were glad to see them improved. MacProject Pro features an import-mapping option (similar to the import data filters common to many database programs) that lets you pick the destination data fields for imported data. To augment data sharing, MacProject Pro offers full publish-and-subscribe and Apple-events support.

With the release of the original MacProject, an entire industry emerged to fill the gaps in the program's reporting capabilities. With MacProject Pro, Claris has built in several new reporting enhancements, including real report formats, color graphics, and other basic amenities. However, these improvements still fall short of what's needed for creating customized presentation-quality reports. Of course, you can export tables and charts to your favorite presentation program and tweak them, but in view of the list price of $599, we feel MacProject Pro should do a better job of handling this aspect of project management.

Like previous versions, MacProject Pro supports subprojects and project families, and the Pro version lets you view and edit more than one project document at a time. You can even create dependency relationships between tasks in different projects. MacProject Pro also offers a baselining command that lets you compare the actual progress of your project with the original plan.

Unfortunately, MacProject Pro still lacks cost-tracking, variance, and analysis tools. For these tasks, you can export

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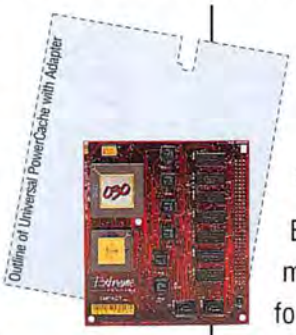


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data to a spreadsheet program (you can even use publish-and-subscribe and Apple events to automate it) and manipulate it there, but considering what you pay for the package, we don't think you should have to. Moreover, several of MacProject Pro's competitors offer cost tracking.

The Competition

MacProject Pro's chief strength is ease of use. It's priced about $100 lower than Microsoft Project, which comes with much better reporting tools and provides more flexibility for entering project data — you can use either Gantt, PERT, or spreadsheet-style tables as well as customized dialog boxes. The latest version of Microsoft Project also includes the ubiquitous Microsoft Toolbar, so that it works much like Word, Excel, and PowerPoint. When it comes to scheduling and analysis tools, however, Microsoft Project and MacProject Pro offer similar functionality. If you need robust power in this area, you'd do well to consider Micro Planner Manager 1.02 as well. For $695, this program provides top-notch analytical tools, although it lacks support for publish-and-subscribe, Apple events, and cross-project resource sharing and leveling.

Another $695 program, Scitor's Project Scheduler 5, can track resources across several projects, integrate projects into groups, and create task dependencies across projects. However, it lacks support for publish-and-subscribe and customized data fields, and its report generator is weak. What it does offer is the advantage of cross-platform compatibility with its DOS sibling.

The Bottom Line

Claris' MacProject Pro incorporates important new features without sacrificing its ease of use. The program's PERT-chart orientation provides an environment that will be instantly familiar to seasoned project managers, and its new outliner gives novice users an alternative to working with unfamiliar PERT and Gantt charts.

Overall, the program can successfully meet the project-management needs of a broad range of users, even though users must be willing to make up for the program's deficient reporting and cost-analysis functions by substituting spreadsheet and presentation programs.

— Don Crabb

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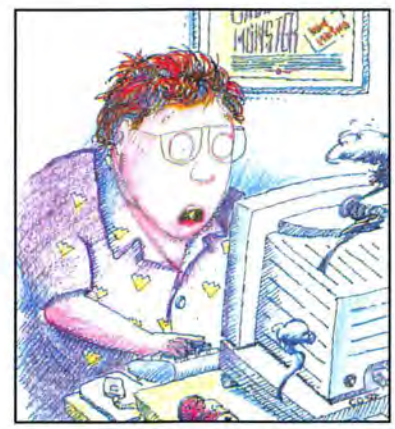
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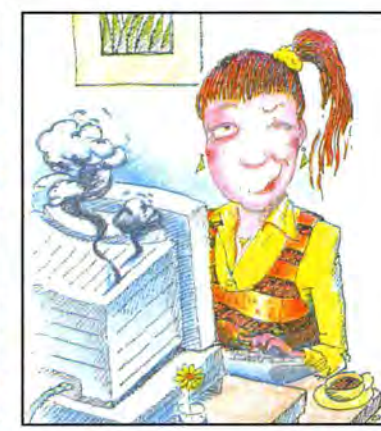


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QUICK CLICKS



Symantec AntiVirus for Macintosh

★★★★

In its latest rendition, Symantec AntiVirus for Macintosh has some great new capabilities and a nicely redesigned interface. But because it's more thorough in its virus checking, it's also slower and it may not get along with your favorite file-compression program.

Like the previous versions, SAM 3.5 consists of an application and a control panel. The application, SAM Virus Clinic, scans for and repairs virus-infected files. The control panel, SAM Intercept, monitors your Mac and alerts you to activities that may have been caused by a virus.

Installing SAM 3.5 is a breeze. Its new installer scans your hard disk for viruses before beginning the installation. A licensed version of Trik's Net Distributor that comes with the new ten-pack makes installing and updating SAM on networked Macs almost effortless.

Once it's running, SAM 3.5 offers improvements in both of its components. Intercept, which boasts a much less cluttered interface in this version, now recognizes when you're running Apple's installer and asks if you'd like it to cease virus checking until after you've quit the installer. Both Intercept and Virus Clinic can scan for viruses within StuffIt and Compact Pro archives by temporarily decompressing them into RAM (although scanning files compressed with StuffIt SpaceSaver produces errors at present). In Virus Clinic, you can schedule virus scans to run at specific times on specific dates. Unfortunately, you must leave Virus Clinic running for the automatic scans to kick in; it would be nice if Intercept could run scheduled scans as well.

In any case, it's a good thing you can schedule scans when you're away, because scans are now much slower than they were in earlier versions — especially if you have Virus Clinic check compressed archives. Because the pesky T4 virus requires thorough scanning of your System file and application files, you have a lengthy lag after booting up with Intercept active. Applications can take as much as 20 percent longer to launch.

Despite its slowness, SAM 3.5 is a significant improvement over its predecessor, especially if you run Apple's installer regularly.

Symantec Corp., 10201 Torre Avenue, Cupertino, CA 95014; 800-554-4403 or 408-253-9600. Version 3.5. Single-user version, $99; ten-pack, $759.

— Eric Taub



Conflict Catcher and Other Innovative Utilities

★★½

Since the success of Now Utilities, the Mac utilities market has been flooded with nifty little add-ons — and nifty little add-on wannabes. Casady and Greene's Innovative Utilities collection is another such wannabe.

Conflict Catcher, the anchor of this collection, is a control panel that helps you find problem extensions and control panels — the ones causing your Mac to crash or otherwise misbehave. Click on the Conflict Test button, and Conflict Catcher systematically turns startup files on and off and repeatedly reboots your Mac. It's your job to check after each reboot to see if the troublesome behavior is still happening. Conflict Catcher will probably help you identify conflicts more quickly than you could by dragging files in and out of their startup folders or turning them on and off with a startup-file manager — but Conflict Catcher lacks some features found in such programs. For example, you can't set up file links that affect loading order or prevent incompatible files from loading, as you can with Now Utilities' Startup Manager.

Another of the utilities, Memory Maxer, could be a gift from heaven for owners of low-memory Macs — if it behaved itself. A combination extension, control panel, and application, Memory Maxer can make the Finder quit whenever you launch an application, giving all or most of your free memory to that application. You can set this to happen only for certain applications or when any application is launched. But the latter setting is temperamental; for example, launching CE Software's CEIAC background application makes the Finder disappear and sometimes Memory Maxer's own background application for relaunching the Finder also vanishes.

A third utility, HotDA, is a control panel that lets you assign a hot key to open anything on your Apple menu. But you can do so for only one menu item. If you want to open five menu items, you'll need to make five copies of HotDA and set each for a different keystroke/Apple-menu-item combination.

Two more utilities provide useful, if minor, features: Color Coordinator changes the number of colors your Mac displays whenever you launch specific applications or when you move between active applications that require different color depth, sparing you repeated trips to the Monitors control panel. Whiz-Bang Window Accelerator speeds up the Finder by hastening the display of the pesky zoom rectangles you get whenever you open or close windows.

Although there are nice touches in this collection, it's not a package everyone needs. Other commercial and shareware utilities can do much of what this collection does — and often do so better.

Casady & Greene, Inc., 22734 Portola Drive, Salinas, CA 93908; 408-484-9228. Version 1.2. $79.95.

— Eric Taub



Star Trek: The Screen Saver

★★★★½

If the true purpose of a screen saver is to give you something fabulously keen to stare at when your productivity ebbs, then Berkeley Systems' Star Trek: The Screen Saver is at the top of its class. It's an all-in-one package containing the After Dark control panel and a collection of 16 unique, Trek-oriented modules.

Some of the cooler modules are Spock, which features an animated Vulcan roaming around your desktop taking tricorder readings, mind-melding with Hortas, playing his Vulcan harp, and occasionally being blasted by Happy Plants; Scotty's Files, which fills your screen with dozens of schematics and specifications for Starfleet's many gizmos; Ship Panels, which generates an animated, ever-changing array of Enterprise instruments and gauges; Final Frontier, a randomly generated presentation approximating a typical "Star Trek" episode (and occasionally making about as much sense); and Tribbles,

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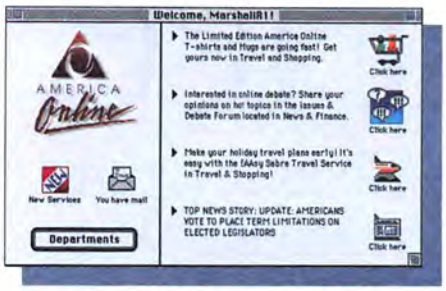
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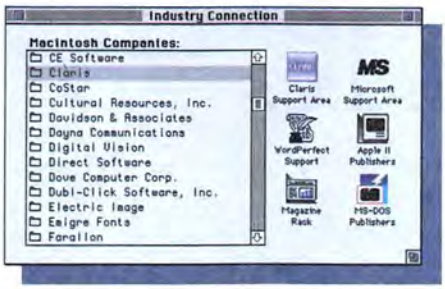
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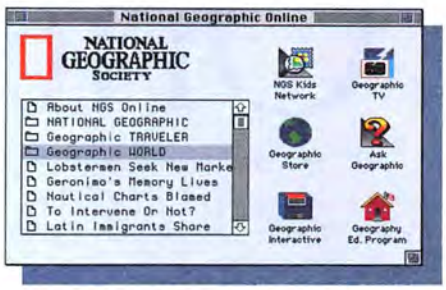
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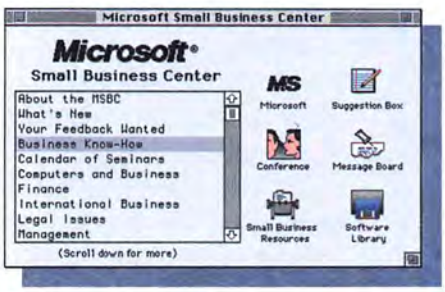
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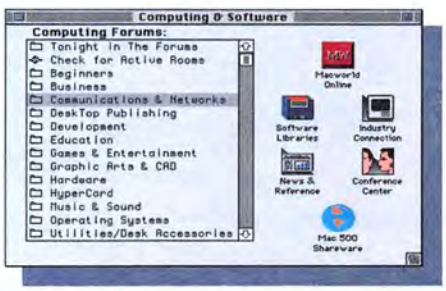
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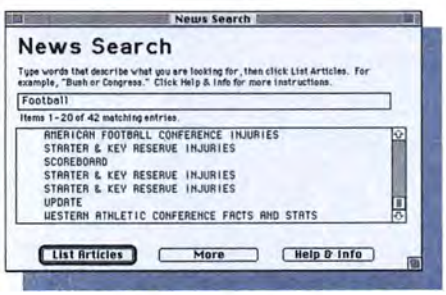
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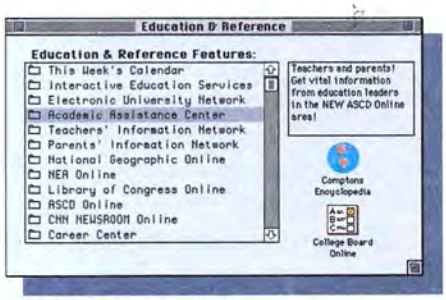
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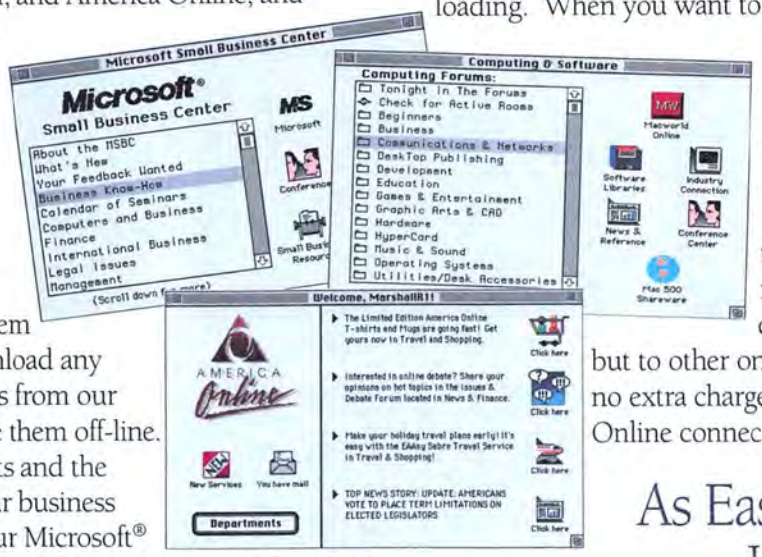
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wherein your screen becomes a quadrotriticale storage bin full of noisy, rapidly reproducing tribbles. Two modules, The Mission and Final Exam, are just nonrandom enough to make you wonder if they really protect your screen from burn-in — but hey, how many people buy screen savers to save their screens anyway?

The graphics are all first-rate, using digitized and original art. Star Trek: The Screen Saver comes with both color and black-and-white graphics files, making it compatible with all Macs — a welcome touch. The sound is stellar as well, thanks to SoundSource AudioClips digitized from actual episodes; sound bites range from the distinctive shweeHOCK of a pneumatic door to the various mutterings of the Enterprise's crew and the occasional dramatic musical sting.

Star Trek: The Screen Saver creates such a realistic Trek experience that at times you can practically smell the hairpiece glue wafting through the movie set. We recommend it highly, both in English and in Klingon: Dogh 'ach val je majQa' 'oH Qu'vatlh Ha' DaH Suq jay.'

Berkeley Systems, Inc., 2095 Rose Street, Berkeley, CA 94709; 510-540-5535. Version 1.0. $59.95.

— Andy Ihnatko



Songworks

★★★★½

You're winging across the country, crunching numbers on your PowerBook when the opening strains of what could be your first megaplatinum hit start Ping-Ponging between your ears. Until now, if you lacked a means of notation and wished to retain that musical nugget, you would have had to hum your ditty over and over until your airline seatmate smothered you with the hypoallergenic pillow.

Ars Nova saves you from premature suffocation with Songworks, a program that notates the melodies you've plunked out on your Macintosh keyboard, on the on-screen piano keyboard or guitar, or on a MIDI instrument. The program can harmonize your one-staff, single-note tune and lets you insert lyrics that align themselves to the proper notes. If you're seeking musical inspiration, Songworks can create melodies based on your ideas.

With Songworks you can also automatically generate bar lines and note beams; change the key, clef, and time signature within a song; export your tune and accompaniment as a standard MIDI file; and employ slurs, ties, duplets, and triplets. Input-quantize is limited to 16th notes (meaning that when you play a note, the smallest rhythmic unit the program recognizes is a 16th note). However, you can use 32nd notes when you're clicking notes into the score.

One minor annoyance is a "feature" that forces chords to remain on-screen even when their melodic counterpart has been deleted. That's fine if you want to insert new melodic material — but if you want to expunge a section of melody and chords entirely, you'll have to do a fair amount of selecting and deleting.

Songworks is not a full-featured



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CIRCLE 212 ON READER SERVICE CARD.

notation or sequencer program. Designed to work on a Mac Classic with a single megabyte of RAM, it's meant as a musical sketch pad and compositional aid. You won't find well-developed page-layout features or note-editing capabilities in Songworks, but you will find an efficient program that lets you slap down a melody, suggests alternative ideas, and produces a reasonable lead-sheet at 20,000 feet.

Ars Nova, 550 Kirkland Way, Suite 140, Box 637, Kirkland, WA 98033; 206-889-0927. Version 1.11. $125.

— Christopher Breen



RightWriter

1½

Grammar checkers are easy to scorn. They can't decipher the meaning of words or sentences, so they often offer erroneous or silly suggestions for improving your prose — but they also catch many grammatical errors that, left uncorrected, would make you look like an idiot.

Version 5.0 of RightWriter won't appease the skeptics. The upgrade adds much-needed features, such as an interactive editor, but it still doesn't have a spelling checker. RightWriter is quick to point out style faults such as passive voice and long sentences, but it doesn't catch the misuse of *to* in "They wasn't to smart."

RightWriter is easy to use. It reads most Macintosh word-processor documents and lets you check them. In addition to its interactive-editing window, in which the program flags potential mistakes and lets you fix them, the program can generate a marked-up copy of the document for later review. RightWriter can also produce an overall critique, including an analysis of the document's sentence structure and readability. Finally, the Clipboard command lets you check sections of text from other applications, such as spreadsheet and database programs.

The program comes with nine predefined writing styles (such as Newsletter and Technical) that determine which grammar and style rules it should apply to a particular document. If you don't like the supplied styles, you can temporarily turn individual rule classes on or off or save custom setups. Turning off a rule such as Unusual Capitalization prevents the program from stopping at every occurrence of *PageMaker,* but then it also makes it ignore typos such as *THe*.

Although Que claims that RightWriter is fully compatible with Microsoft Word, we found that the interactive editor didn't recognize smart quotes or special characters in Word documents. *Isn't* became *isnt,* and *résumé* turned into *rsum*. In the former instance, the program flagged the sentence as incomplete because it couldn't find a verb.

RightWriter can help you fine-tune your writing, but until it catches problems such as *a good tests* and *There are only one Santa Clas,* you'll still need a critical human eye.

Que Software, 11711 N. College Avenue, Carmel, IN 46032; 800-992-0244 or 317-573-2500. Version 5.0. $99.95.

— Aileen Abernathy

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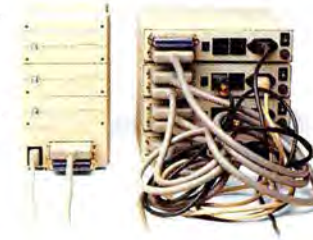
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Compact and *Colorful*

The Color Classic may be the Mac of your dreams, and the LC III is the fastest LC yet.

BY RUSSELL ITO

Even in an industry that can change in a nanosecond, patience is sometimes a virtue. If you wait long enough, you often get what you want. People who wanted less expensive Macs are finally getting them. Users who wanted truly portable Macs have gotten them with a vengeance. Patience can indeed pay off — and possibly never more so than this year.

Beginning with the round of CPU announcements we're detailing in this issue (encompassing six new machines), you can expect to see more new and revised Macs this year than ever before. From the bottom to the top, Apple is re-creating and expanding its desktop line, filling gaps along the way. On the low

PHOTOGRAPHY: STEVEN UNDERWOOD


MACINTOSH
LC III
Macintosh LC III
Color
Classic
Macintosh
Color Classic

end, two noticeable gaps have been color and speed, so Apple has turned its attention to satisfying its customers' demands, producing the first color compact Mac and a significantly faster LC that retains that machine's slim design.

The Color Classic: At Last!

In many ways, the Color Classic is the compact Mac everyone's been waiting for since, well, since 1984. The first Mac with an internal color display, the Color Classic retains a look that's clearly descended from that of the original 128K Macintosh. Slightly deeper than previous compact models in order to accommodate the larger video tube, the Color Classic also features an enlarged front bezel that extends above the rear case. Unlike that of its Classic cousins, however, the Color Classic case sports feet (see Figure 1), which also keeps the computer in step with such contemporaries as the Duo Dock and the new Centris 610 and Quadra 800.

Figure 1: Facing the Color Classic

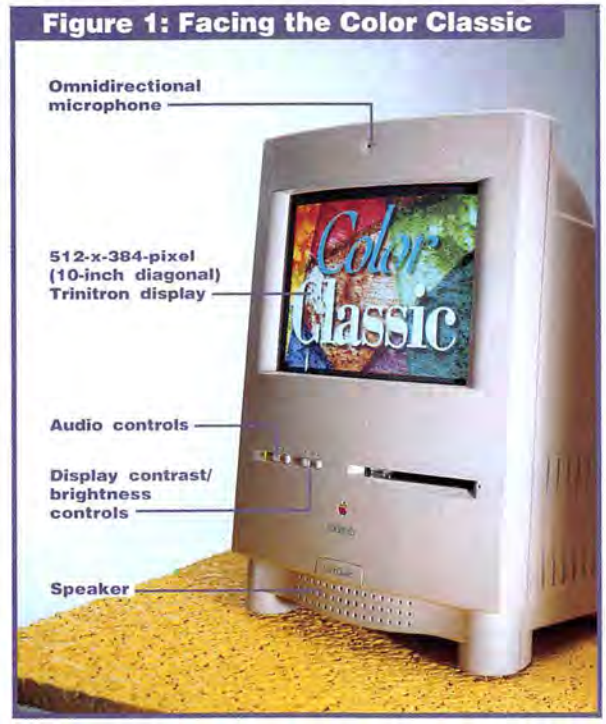


Figure 1: The Color Classic is the compact Mac everyone's been waiting for. With an internal color display capable of exhibiting as many as 32,000 colors, an open slot, an easily accessible motherboard, and an optional math coprocessor, it's an excellent package.

Internally, the Color Classic is very much like the LC II. The video circuitry supports up to 8-bit color (256 colors) on the sharp, bright, internal Trinitron tube, and the screen resolution is the same as it is on the 12-inch RGB monitor intended for the LC: 512 x 384 pixels, which translates to a pixel resolution of 76 dpi.

But Apple has done more than just put the LC's video circuitry into a new box. A new control panel included with the Color Classic conserves power (see Figure 2). The Color Classic can be set to dim the screen automatically after a user-specified period of inactivity, cutting its power consumption by 50 percent. Clicking the mouse button returns the system to normal brightness. Especially attractive given the federal government's impending standards for computer energy consumption, this new feature should, in the long run, save energy and extend the life of the tube, which will ultimately reduce both energy and maintenance costs.

The Color Classic also offers energy conservation of another sort. Anyone who's ever wrestled with a compact Mac knows that getting into the darn thing involves a struggle. Opening the case requires either a pair of well-positioned karate chops to the sides or an assortment of tools that look like castoffs from an orthopedic surgeon's office. No more. The Color Classic sports an entirely new design. Getting the motherboard out is a cinch. All you have to do is open a small panel on the back of the Color Classic and pull the motherboard out. No connectors to disconnect, no wires to avoid: The whole thing just slides out (see Figure 3). To reposition it, you just slide it back in and push until it's seated. The front edge of the motherboard contains all the necessary connectors, so once the motherboard is in place, all the connections are made automatically.

An LC II Under the Hood

A closer look at what's inside the Color Classic reveals a machine that's very similar to the LC II. The heart of the Color Classic is the same 16-megahertz 68030 processor as in the LC II, and like the LC II, it comes with 4 megabytes of RAM soldered onto the motherboard; a single SIMM socket allows for memory expansion of as much as 10 megabytes. (To get to 10 megabytes of RAM, you have to install a single 8-megabyte SIMM, so you end up with 12 megabytes. Like the LC II, however, the Color Classic recognizes only as much as 10 megabytes.)

Another LC II holdover is the Color Classic's PDS (processor-direct slot): It's identical to the LC's and the LC II's, so third-party-card developers don't have to start from scratch. The slot gives you the option of adding an accelerator; faster networking such as Ethernet; or a video card for a second, larger monitor (some third-party cards now come with video and Ethernet support on the same card, so you can add both options in spite of the single slot). Adding a second monitor doesn't disable the internal display either, so you can set up a dual-display system with your choice of primary screen.

Although this is the first compact Mac since the SE/30 to have a slot, Apple didn't give the Color Classic the same data path. Just like the LC II, the Color Classic uses

a 16-bit data bus rather than a faster 32-bit bus like the old SE/30's. As was the case with the LC II, cost was a deciding factor in going with the slower standard.

The Color Classic's motherboard sports two other notable options: an open FPU socket and a VRAM SIMM socket. The FPU, or math coprocessor, is strictly an option, because Apple won't ship a configuration of the Color Classic that includes it. However, Apple offers an FPU upgrade kit for those who decide to add an FPU themselves. Installing an FPU is just a matter of pushing it into the open socket, so you should be able to handle the job. The single VRAM socket lets you upgrade the internal video to 512K, enough to drive the internal display at 16 bits (32,000 colors) — the optimal pixel depth for QuickTime.

The Color Classic's extended front bezel also offers a few other beneficial features. An integrated, omnidirectional microphone is set into a small dimple on the top edge directly above the screen, and the audio-playback controls are conveniently located just below the screen. Right next to the audio controls are buttons for adjusting the display's contrast.

To further keep the essential controls accessible, Apple constructed the Color Classic as the first compact Mac you can turn on and off from the keyboard. A master power switch on the back of the Color Classic turns the juice on, but to start the machine, you have to press the power key on the keyboard. Unlike the other Macs that use the keyboard for startup, however, the Color Classic is the only Mac you can turn off from the keyboard as well. We just hope that users don't discover this feature at an inopportune moment.

LC Performance in a Compact

In testing a prerelease Color Classic, we compared it with both a Classic II (a monochrome machine) and an LC running in 8-bit color, using internal video circuitry. Although the Color Classic is most like an LC II, our previous tests of the latter machine showed that the LC II's 68030 didn't make that machine any faster than the original 68020-based LC. So if you want to know how the Color Classic's speed compares with that of an LC II, just add the Roman numerals to the LC's label in Figure 4.

Driving its internal display at 8 bits (256 colors), our test Color Classic essentially matched the speed of an LC running under similar conditions. (In normal usage, differences of less than 15 percent are virtually unnoticeable unless you're using a stopwatch to time your machine.) Compared with the Classic II's, the Color Classic's speed was more impressive. Considering that it was driving an 8-bit-color display whereas the Classic was driving only a 1-bit monochrome display, we were surprised that the Color Classic and the Classic II tied in all but one test. The one test in which the Classic II skunked the Color Classic was the Word scroll, where those extra bits really penalized the Color Classic. Even in that test, though, the Color Classic's scrolling speed wasn't exactly slow: It matched the LC's speed almost exactly.

Only marginally more expensive than the Classic II and almost exactly the same price as the LC II (which, remember, doesn't include a monitor), the Color Classic is an easy winner. Its performance equals that of either of those machines, and the Color Classic includes expansion options — specifically an open slot — that the Classic II doesn't even offer. Given all that, it's hard to find an argument in favor of the Classic II.

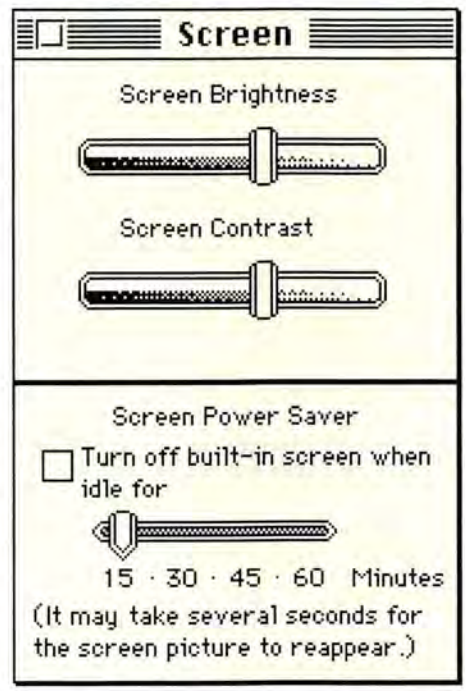


Figure 2: A new control panel included with the Color Classic allows the system to automatically reduce the display's power consumption by 50 percent after a user-specified period of idle time. Clicking the mouse button brings the screen back to normal.

The LC III: Finally, a Fast LC

When Apple introduced the LC II, it made only one basic change to the original LC: It swapped a 68030 processor for the original's 68020. The result was — well, an LC with a 68030 processor. The swap made no difference in performance, and except for the option of running virtual memory, there really wasn't much to be gained from upgrading to the new machine.

With the LC III, however, the story is a little different. Apple has again made a simple chip swap, but it's also made another significant change: In addition to having a faster processor, the LC III is the first low-end machine since the SE/30 to sport a 32-bit-wide data bus. The result is significantly better performance.

Instead of the LC II's 16-megahertz 68030, the LC III uses a 25-megahertz 68030 — the same chip as in the IIci. Although it uses the same box and the same PDS as the LC II, the LC III

offers several significant advantages over the LC II, even beyond speed.

Instead of having the LC II's limit of 10 megabytes of RAM, the LC III offers RAM expansion to as much as 36 megabytes. The LC III includes a socket for an optional FPU, and the LC III's internal-video support is much more extensive than the LC II's.

With its standard 512K VRAM soldered onto the motherboard, the LC III can drive a 14-inch monitor at 8-bit color; with the addition of a 256K VRAM SIMM, for a maximum of 768K, the LC III can drive that same monitor at 16-bit color (more than 32,000 colors) and a 16-inch monitor at 8-bit color — feats the LC II can't perform at all.

Figure 3: Inside the Color Classic

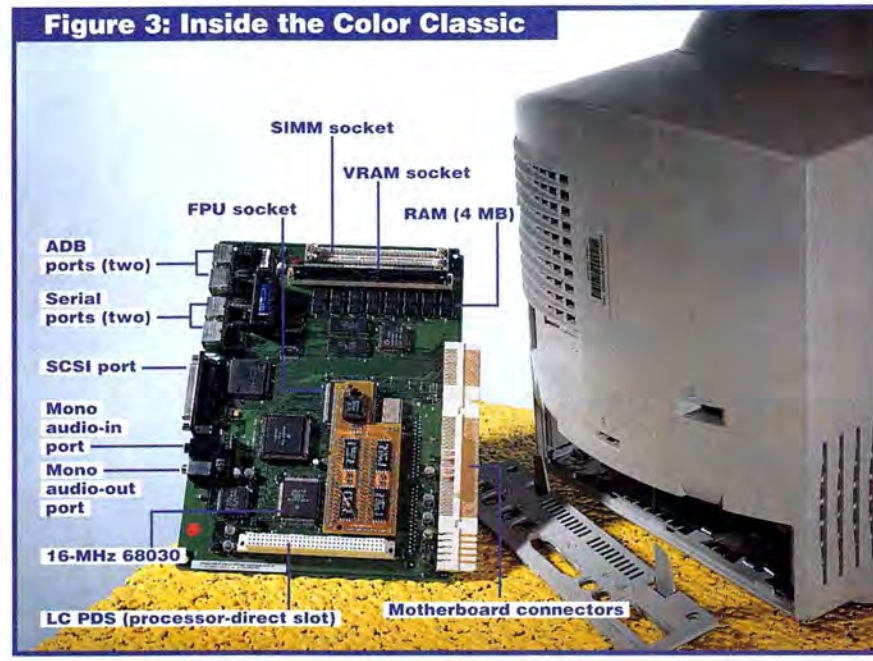


Figure 3: Getting to the Color Classic's motherboard is a snap. All you do is remove a small panel on the back of the machine and pull the motherboard out. The fingers on the leading edge of the logic board provide all the necessary connections. (The daughterboard is an engineering ROM that isn't on the shipping board.)

Two Times an LC

Compared with the LC, the LC III is a screamer. Our prerelease LC III was never less than 1.75 times as fast as an LC, and it was 2 times as fast overall.

The advantages of having a processor that's more than half again as fast and a data bus that's twice as wide (32 bits instead of 16) were especially evident in the more-data-intensive tests, in particular the Excel-spreadsheet recalculation, in which the LC III was more than 2.25 times as fast; the PageMaker font change, in which it was 2 times as fast; and the Word find-and-replace, in which it was almost 2.25 times as fast (see Figure 5).

Although the LC II looks decidedly poky compared with the LC III, Apple isn't going to discontinue the older machine. The LC II will remain in the line, but because the LC III's list prices are roughly the same as the LC II's prices, it's pretty obvious that Apple would like its users to move up to the faster machine. Apple is even encouraging current LC owners to make the move, by offering an attractively priced ($599) upgrade kit.

Patience Pays Off

In many respects, the Color Classic is long overdue, but now that it's here, it's very welcome. With its small footprint, the Color Classic is an ideal machine for home

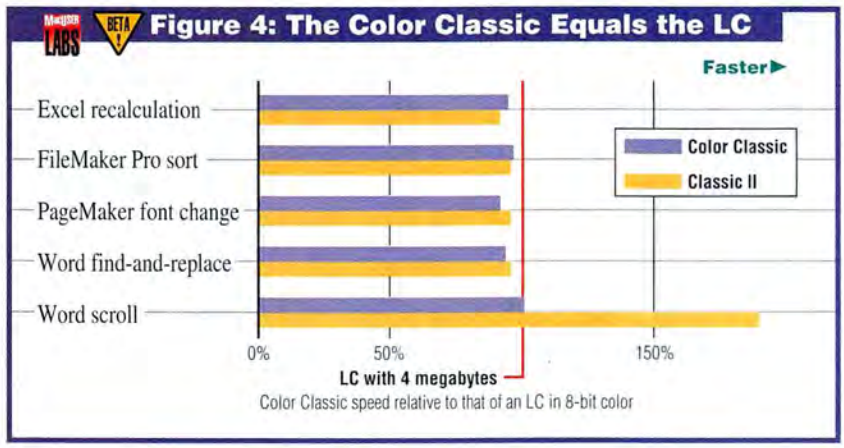


Figure 4: The Color Classic matches the speed of an LC almost perfectly. (We chose to compare the Color Classic with an LC and not an LC II, because there's no performance difference between the LC and the LC II.) The Color Classic virtually tied the Classic II in all but one test, even though the Classic II is a monochrome machine and thus should have had an edge. The Classic II won the scroll test, because it was displaying only in monochrome (1 bit). We tested all the machines in 4/80 configurations, using 8-bit internal video in the Color Classic and the LC.

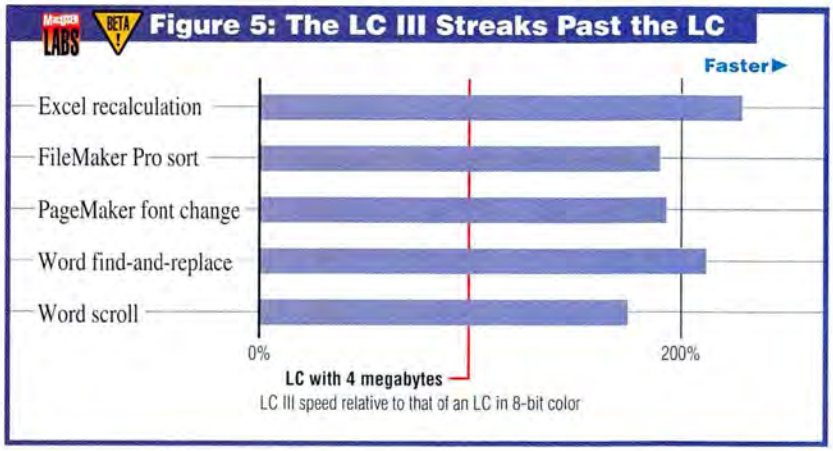


Figure 5: The speediness of the LC III's processor (25 megahertz versus 16 megahertz) and wider data bus (32 bits versus 16 bits) really showed in our tests. The LC III was 2 times as fast as an LC overall and more than 2.25 times as fast in the Excel-recalculation test. We tested each machine in a 4/80 configuration, using 8-bit internal video and a 14-inch Macintosh Color Display.

users; students; small-business owners; and any application that isn't as processor-intensive as, for example, 3-D-graphics creation, photo-realistic-image manipulation, or four-color process work. Word processing, presentation graphics, and working with average page layouts and spreadsheets are all reasonable tasks for the Color Classic. For most uses, the Color Classic is a fine fit, and its screen is bright and sharp.

At a price that's only a bit higher than that of the monochrome Classic II and about the same as that of the monitorless LC II, the Color Classic is an excellent value. Its open slot makes it possible to add Ethernet, an accelerator, or another monitor, and you can even add a math coprocessor if you need to because you have an application that can really take advantage of one (most programs don't). With its overall flexibility (including the option of 16-bit-color video), the only limitation facing the Color Classic is its 16-bit architecture. Because of its narrower data bus, the Color Classic will never be as fast as, say, the LC III — but then, if Apple had built the Color Classic with a 32-bit data bus, it wouldn't have had to build the LC III.

When Apple introduced the LC II, we couldn't recommend that anyone upgrade from the LC, because there wasn't any performance advantage. But with the LC III, we definitely urge LC owners to upgrade. The upgrade price is very reasonable, and the edge to be gained is considerable. With double its predecessor's speed and more than triple the RAM capacity, the LC III is a significant entry into the low end of Apple's line. At a price that's roughly the same as that of the current LC II, the LC III is at least as good a value as the Color Classic — if not more of one.

The one question that hangs over the Color Classic and the LC III is whether either or both are likely to show up recycled as Performa machines, in the same way that the Classic II became the Performa 200 and the LC II became the Performa 400. We asked Apple and received this sphinxlike reply: "Every product is under consideration for the Performa program." Well, as we said earlier, if you wait long enough

Russell Ito is patiently waiting for a Mac that's less expensive than a 486 clone.

Table 1: The Color Classic and the LC III at a Glance

	Color Classic	LC III
List price*	$1,389 (4/80)	$1,349 (4/80) $1,669 (8/160)
Dimensions (L x W x H)	12.6 x 9.9 x 14.5 in.	15 x 12.2 x 3.2 in.
Weight	22.5 lb	8.8 lb
CPU	16-MHz 68030	25-MHz 68030
Memory	4 MB standard, 10 MB maximum	4 MB standard, 36 MB maximum
Internal display	512 x 384 pixels (10-in. diagonal); 76 dpi	NA
Video	256K (8 bits) of VRAM standard, 512K (16 bits) maximum	512K (8 bits) of VRAM standard, 768K (16 bits) maximum
Display support	internal display	8-bit, 640 x 480 pixels with 512K of VRAM standard; 16-bit, 640 x 480 pixels with 768K of VRAM; 8-bit, 832 x 624 pixels (16-inch) with 768K of VRAM
Interfaces	ADB (2), serial (2), SCSI, LC PDS	ADB, serial (2), SCSI, LC PDS
FPU	optional	optional
Audio support	mono audio-out; mono audio-in; integrated, omnidirectional microphone	mono audio-out, mono audio-in

*At press time.

Mainstream Marvels

The new Centris Macs bring 68040 power to mainstream users. The Quadra 800 may be the most elegant Mac yet.

BY RUSSELL ITO

High-tech companies often act like politicians: They pay attention to the extremes and ignore the middle ground. High-end, high-powered products are always hot, because the power users who adopt them early are always clamoring for more power. Low-end, affordable products are increasingly important, because mass-market computers are contributing more and more to the corporate bottom line. Unfortunately, in all the noise at the extremes, mainstream desktop users — much like the middle class or middle children — have largely been ignored. Having produced only a single intermediate desktop machine (the IIvx) in all of 1992, Apple has bolstered its midlevel efforts this year with a whole new line — the Centris series — and has also expanded the high end with a new base-model Quadra.

Centris: The New Middle Class

Going along with the auto-marketing trend toward meaningless names that sound important, Apple's new Centris line will serve as the company's mainstream, midlevel computers. What's somewhat confusing, initially, is that the Macintosh IIvx is now considered part of the Centris line, even though it doesn't carry a Centris label. Nonetheless, the Centris machines (Centrises? Centrae? Centrii? What the heck is the plural of *Centris*, anyway?) form Apple's new desktop standard in performance, flexibility, and expandability.

Although the two Centris models look radically different from each other, they do have three features in common: CPU type, video support, and CD-ROM options. The Centris 610 and 650 are both 68040-based Macs, but the specific 68040s they use differ from each other in speed and features. The video support is the same for both units. The 610 and 650 each come with 512K of VRAM, which is enough to support 8-bit video (256 colors) on monitors as large as 16 inches. If you max out the VRAM to 1 megabyte, you can drive a 16-inch display at 16 bits (more than 32,000 colors). Like the IIvx, Centris models that ship with the optional CD-ROM drive installed also come with 1 megabyte of VRAM standard, so those models are 16-bit-ready right out of the box. Apple is making CD-ROM a standard element of its mainstream efforts, so both Centris models include bays that can accommodate CD-ROM drives.

The Centris 610: Power in a Pizza Box

The Centris 610 uses a new design; the computer looks either like an LC on steroids or a pizza box with legs. Wide, low, and flat, the Centris 610 sets something of a new price/performance standard, being the first 68040-powered computer from any manufacturer that is

PHOTOGRAPHY: STEVEN UNDERWOOD


MACINTOSH
Quadra
800
Macintosh
CENTRIS
610
Macintosh
CENTRIS
650

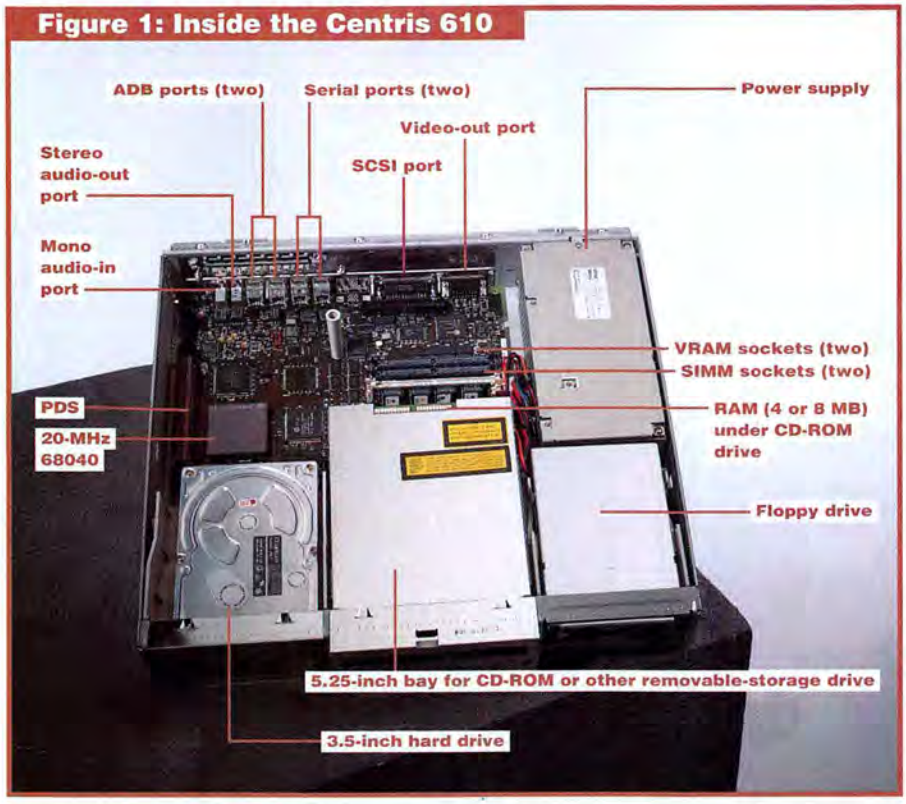


Figure 1: There's a lot of room for expansion inside the Centris 610's slim case, including room for an internal CD-ROM drive and a single, 7-inch NuBus card (inserted in the PDS with a NuBus-adapter card).

slated to sell for a little less than $2,000.

One of the keys to getting that price down was Apple's choice of CPU. The Centris 610's 20-megahertz 68040 is officially named the LC68040, and when you look at it, you'll immediately notice that it's different from other 68040s you may have seen. The big change is that the LC68040 doesn't require the massive heat sink found on other 68040s. Unlike the spiky-topped chip you're probably familiar with, the Centris 610's 68040 has a flat top. The reason for the missing heat sink is that the Centris 610's 68040 doesn't have the floating-point math circuitry other 68040s do, and this, combined with the LC68040's slower clock speed, means that the CPU doesn't draw as much power as other 68040s do.

The 610's CPU is teamed with either 4 or 8 megabytes of RAM on the motherboard, depending on the configuration, plus two additional SIMM sockets for as much as 68 megabytes of RAM total. If you want an FPU, however, you're out of luck. Not only does the CPU lack that circuitry but there isn't even a socket on the motherboard for an FPU.

On the other hand, there's ample room for expansion in the box (see Figure 1). A new, high-speed SCSI bus that's more than twice as fast as previous versions is teamed with both an open, 5.25-inch, half-height bay for the addition of a CD-ROM drive or other removable-media device and a PDS (processor-direct slot) for the addition of either a PDS card or a single, 7-inch NuBus card. Adding a NuBus card to the 610 is similar to adding one to a IIsi: You have to plug a NuBus-adapter card in to the PDS and then plug the NuBus card in to the PDS adapter.

Twice as Fast as a IIci

Compared with a similarly equipped IIci, our prerelease Centris 610 was about twice as fast (see Figure 2). However, as we've found in testing other 68040 machines, that overall figure can be deceiving. Performance boosts are very application-dependent. Some programs love the 68040 and really scream when they get ahold of one; others are indifferent.

In our suite of tests, the 610 was anywhere from about a third faster than a IIci to more than 2.5 times as fast, depending on the task. The smallest gain was in the Excel recalculation, and here the reduced 68040 may have played a big part. Because the LC68040 doesn't have a math component and the IIci has a true math coprocessor, the IIci's speed was closer to the 610's than it was in our other tests. Still, the reduced 68040 managed to outcalculate the combination of the IIci's 68030 CPU and 68882 math coprocessor by more than a third.

The biggest gain we saw was in the Illustrator preview. Adobe Illustrator is one of those programs that loves the 68040, and the preview performance really demonstrated that. The 610 completed the preview almost 2.75 times as fast as the IIci.

The FileMaker Pro and Photoshop tests on the 610 also saw significant performance boosts over the same tests on the IIci. These tests, however, benefited not only from the faster processor but also from a significantly faster drive. Because our baseline machine was a 5-megabyte unit and the Centris line ships only in 4- or 8-megabyte configurations, we opted for the higher RAM capacity for our tests. We minimized the difference in

Interleaved Memory

A big part of the Centris 650's and Quadra 800's performance wins comes from their memory architecture. Apple's new interleaved-memory design makes memory access faster by tricking the Memory Manager.

In a noninterleaved environment, with two physical banks of memory — we'll call them Bank 0 and Bank 1 — all of Bank 0 must be addressed before the Memory Manager can address Bank 1, because the manager sees the two physical banks as two separate logical banks as well. In 68040 terms, this means that the 68040's burst accesses of four adjacent long words, or 16 bytes (a long word is 4 bytes and is the 68040's standard memory unit), must all be written to one bank before the next bank can be addressed.

In an interleaved system, the Memory Manager sees the two physical banks of memory as a single, logical bank that's twice as large. As a result, the first long word in Bank 0 can be followed immediately by the second long word in Bank 1, the third long word in Bank 0, and the fourth long word in Bank 1. Overlapping the second and subsequent long words in alternate physical banks accelerates 68040 burst accesses by as much as 30 percent.

RAM capacity between the test and baseline machines as much as possible by keeping the application memory partitions consistent. Our 8-megabyte configuration, however, also included a 230-megabyte hard drive, because 8/230 is one of Apple's standard configurations. Apple's 230-megabyte drive is significantly faster than the 80-megabyte unit, so a good portion of the performance increase we saw was attributable to the drive.

The Centris 650: Upper Middle Class

From the outside, the Centris 650 looks very familiar: That's because it uses the same box as the IIvx. Inside, it's a different story. Although the Centris line is positioned as the middle of Apple's line, the Centris 650 straddles the border with the high-end Quadra series.

One of the main reasons for the Quadra crossover is the Centris 650's CPU: It's a 25-megahertz 68040, the same chip that powers the Quadra 700. But the Centris 650 goes beyond the Quadra 700 when it comes to RAM. Like the Centris 610, the 650 comes with either 4 or 8 megabytes of RAM on the motherboard, but with additional SIMMs, you can increase the RAM capacity to 132 megabytes.

To further confuse things, the Centris 650 actually shares some of its basic architecture with the new Quadra 800. One of the key shared elements of that design is a new internal video architecture that's accelerated in ROM. The new technology is optimized for drawing solid, filled rectangles and for vertical scrolling, so, for example, preparing presentations should be significantly snappier.

As for expansion, the Centris 650 is more like the IIvx than like the Quadra 700. The Centris 650 includes three NuBus slots, the same high-speed SCSI bus as in the Centris 610, and a 5.25-inch half-height bay for a CD-ROM drive or other removable-media storage system. For performance boosts, the 650 also includes a PDS and a socket for an optional FPU.

A Virtual Quadra

Our prerelease Centris 650 ripped past our baseline IIci (see Figure 2). Overall, it was more than 2.5 as fast as the IIci, and it was never less than 2 times as fast in any of our tests.

The fastest times were returned in the Excel and Illustrator tests. In these tests, the 650 benefited not only from the integration of the 68040 but also from two hardware innovations the 650 shares with the Quadra 800: accelerated, optimized QuickDraw (mentioned earlier) and interleaved memory (see the "Interleaved Memory" sidebar). The faster, more powerful processor combined with these Apple innovations pushed the 650's Excel-recalculation speed to more than 2.75 times as fast as the IIci's and its Illustrator-preview speed to nearly 3.25 times as fast. Comparing these results with the same tests run on a Quadra 700, which uses the same

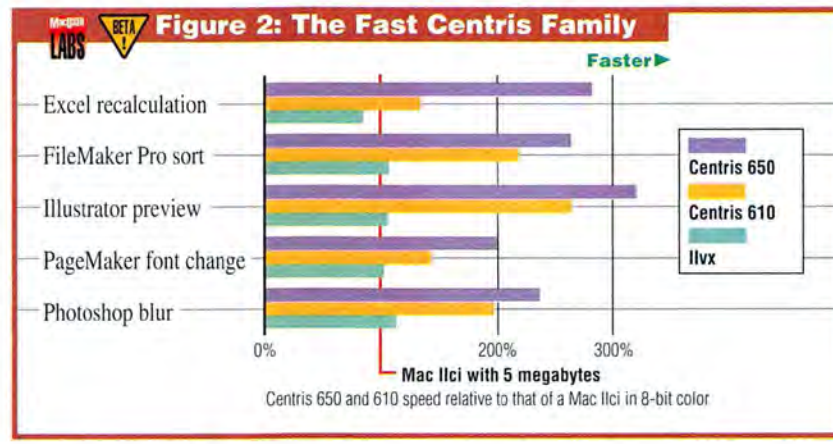


Figure 2: With their 68040 CPUs, the new Centris machines flew past the 68030-powered IIci and IIvx. The Centris 610 was about 2 times as fast as a IIci overall, and the 650 was more than 2.5 times as fast. The 650's active math circuitry explains its performance in the Excel test compared with the 610's. The Centris machines Apple supplied were both 8/230 configurations, so some of the performance gains in the FileMaker Pro and Photoshop tests are attributable to the faster drive. The application memory sizes were set consistently to minimize the difference in RAM capacity between the Centris machines and the IIci. We tested all the machines with 8-bit internal video and a 14-inch Apple Macintosh Color Display.

68040 chip as the Centris 650, put the two machines in a tight race. The Centris 650 was faster in both instances, but not by huge margins. In the Excel test, it was about 25 percent faster than the Quadra 700, but in the Illustrator test it was only about 10 percent faster.

As with the 610, we tested the 650 with Apple's 230-megabyte drive and 8 megabytes of RAM. So once again, some of the speed gains seen in the FileMaker Pro and Photoshop tests are attributable to the faster drive.

The Centris machines will have more of an impact than any other Macs introduced in recent memory. With the release of the 610 and 650, Apple will drop four machines from its price list. The Mac IIci, IIsi, and Quadra 700 will all cease to exist, and outside the U.S., Apple has already discontinued a fourth machine, the IIvi (a slower version of the IIvx — no jokes, please).

The terminated machines, however, are not likely to be missed: The Centris models are much faster and cost about the same.



Figure 3: The Quadra 800 is one of Apple's most elegant creations. It packs a lot of power into its compact minitower case.

The Quadra 800: Power and Elegance

Having brought the power of the 68040 down to the midlevel Centris line, Apple had to back up to the Quadras and tinker with that series. The result, the Quadra 800, boasts one of the most powerful and elegant designs Apple has produced so far (see Figure 3). A minitower, the Quadra 800 is sort of a shrunken Quadra 950, with virtually the same performance but not quite as many expansion options.

The new case design also entailed a new motherboard design (see Figure 4). The Quadra 800's motherboard is readily accessible, because it's held in place by only a few plastic clips. The logic board is positioned vertically on the right side of the case, and you remove it simply by undoing a couple of catches on the top of the board and lifting it out.

A Smaller 950

Just like the Centris 650, which uses the same 68040 as that found in the Quadra 700, the Quadra 800 has the same CPU as that in an existing machine, the Quadra 950. The Quadra 800 uses the same 33-megahertz 68040 chip as the Quadra 950 does and comes with the same amount of RAM standard: 8 megabytes. With four additional SIMMs, you can increase the 800's memory capacity to a maximum of 136 megabytes, compared with the 950's 256 megabytes, but that's still more than enough for most users.

The Quadra 800's built-in video support is also quite extensive. The 800 ships with 512K of VRAM standard, which is enough to drive even a 16-inch monitor at 8 bits of color. With an additional 512K of VRAM, the 800 can drive that same 16-inch monitor at 16 bits of color and even Apple's 21-inch monitor at 8 bits of color. And like the Centris 650, the Quadra 800 offers accelerated, optimized QuickDraw in ROM.

When it comes to storage capacity and expansion, the Quadra 800 packs an awful lot into its compact case. In addition to a 5.25-inch removable-drive bay for a CD-ROM, DAT (digital audiotape), or MO (magneto-optical) drive, the 800 offers two 3.5-inch half-height bays — three, if you count the floppy drive's bay — and if you prefer, you can use those two half-height bays as a single full-height bay for a 5.25-inch drive. If you fill up all those SCSI bays, however, you do pay a price. Unlike the Quadra 950, the Quadra 800 has only a single SCSI bus, so adding SCSI devices to the box reduces the

Fast Photos

CD-ROM drives aren't known for their speed, and generally there isn't much you can do about it. But if you plan to do a lot of work with Kodak's new Photo CD-format CD-ROMs, you should buy a computer with the fastest CPU you can afford.

Because the Photo CD format is a compressed format, the time it takes to open an image is directly related to the amount of CPU power you can throw at the job of decompressing the bits: The faster the processor, the faster the decompression.

Using a IIvx as the standard, we opened the same image by using Apple's internal CD-ROM drive on four machines: the IIvx, the Centris 610 and 650, and the Quadra 800. The results were surprisingly linear: The 610 was more than 50 percent faster than the IIvx, the 650 nearly 75 percent faster, and the Quadra 800 nearly 100 percent faster.

So for Photo CD work, don't skimp on the computer.

number of other devices you are able to daisy-chain off the box. For card expansion, the 800 offers three NuBus slots and a PDS. Using the PDS, however, blocks a NuBus slot.

Trouncing the 700

Comparing our prerelease Quadra 800 with a Quadra 700, we found that the 800 was a little less than half again as fast as a 700 overall (see Figure 5). The test results were very consistent, with no more than a 15-percent variance from the fastest result to the slowest. Unlike with the Centris tests, we were able to use the same 230-megabyte drive for both the test machine and the baseline model, so the results were much more comparable.

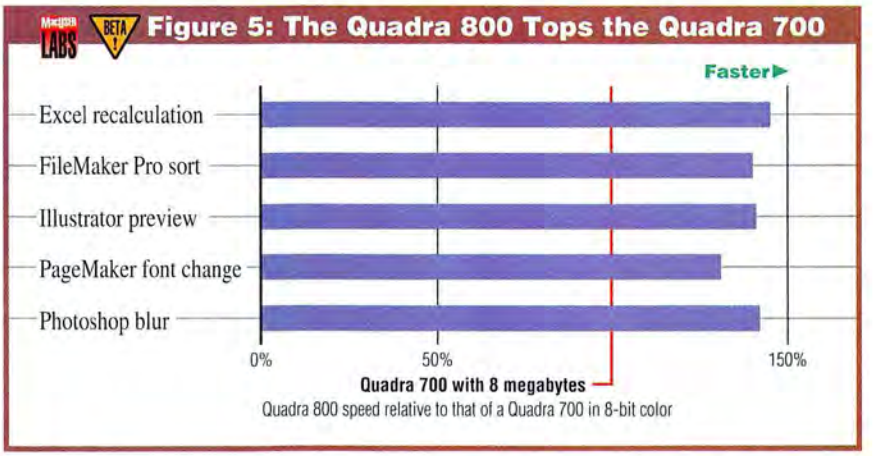


Figure 5: Overall, the new Quadra 800 was about 1.5 times as fast as the Quadra 700, which is being discontinued. Speed, however, is only part of the Quadra 800's story. The 800 is fast, but its numerous storage and expansion options add to its attractiveness. We tested both machines in 8/230 configurations, with 8-bit internal video driving a 14-inch Apple Macintosh Color Display.

We did, however, discover an anomaly in one of our tests. In studying our PageMaker results, we concluded that there is something in Aldus' program that simply doesn't like the Quadra line. The Centris 610 — with its stripped-down, slower 68040 — actually matched the Quadra 950's time in our PageMaker tests. In fact, the Centris 650 was faster than any of the Quadras. Because the PageMaker test within the Quadra line was consistent — that is, the 800 was faster than the 700 and even slightly faster than the 950 (a result we attribute to the 800's improved memory management and its accelerated video), we concluded that the problem lay with the software rather than with the machines.

Whether the Quadra 800 or the Centris 650 replaces the Quadra 700 is one of those "Is the glass half empty or half full" conundrums. However you look at it, the 700 is gone, and unfortunately, 700 owners won't have an upgrade path to the 800: The designs are radically different.

On the other hand, potential Quadra 950 buyers now have an interesting option. The 800 offers virtually the same performance as the 950 but in a smaller case. The 800 doesn't offer as many expansion options as the 950 does (three NuBus slots versus five; a single SCSI bus versus two), but those limitations should be a problem only if you normally fill up your machine with cards or if you regularly hang seven peripherals from your Mac.

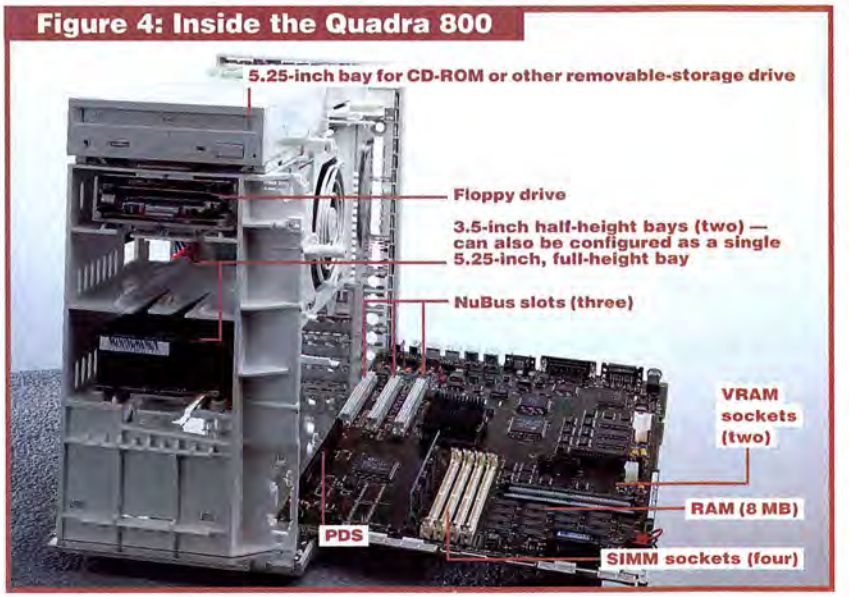


Figure 4: When the case is removed and the easily accessible motherboard is exposed, you can see some of what the Quadra 800 has to offer.

The Power in the Middle

The Centris 610 and 650 establish Apple's new desktop standard. They're fast, flexible, and aggressively priced — so much so that they cast a pall on their lesser cousin the IIvx. As you can see from our speed tests, the IIvx didn't fare too well compared with the Centris machines, which raises the question of whether Apple is really going to have three

machines in the middle of its product line or only two. Certainly, based on price and performance, there's no reason to choose a IIvx over one of the Centris models. The Centris 650 costs about $500 less than the IIvx, and when you consider that the 650 is more than two times as fast as the IIvx and still offers all the same expansion options, the slower machine disappears into the wallpaper. That Apple has already terminated the IIvx's poor relation, the IIvi, outside the U.S. may be an indication of its plans for the IIvx. (If, in fact, the IIvx fades into oblivion, it will go down as one of the shortest-lived computers Apple has ever produced.)

But although Apple may not have done itself proud with the IIvx, it can certainly take some pride in the Centris models (the awkward name notwithstanding). Bringing the 68040 down to mainstream users significantly strengthens Apple's position — and not just among potential Mac buyers. Users who might be tempted by the lure of a fast 486 clone may want to take a hard look at the Mac instead.

As for the Quadra 800, it is simply one of the most elegant machines Apple has designed so far. It is powerful, offers lots of expansion options, and is compact enough to fit into virtually any environment. In fact, the Quadra 800 is about the same size and weight as the Color Classic. Priced at well under $5,000 for a base model, the Quadra 800 is a perfect choice for anyone doing compute-intensive work who wants the Quadra 950's power but who doesn't need the extra slots or have the room for the larger box.

Midlevel-desktop-computer users who may have been feeling neglected the last couple of years, what with Apple concentrating so much of its energy on the portable-computer market, have reason to rejoice. Apple's new Macs reestablish its commitment to the desktop and offer users a feast of benefits.

Russell Ito is trying to figure out how to sneak a Quadra 800 into this year's capital budget.

Booting from a CD-ROM

Centris 650 and Quadra 800 buyers who choose machines equipped with Apple's internal CD-ROM drives get an additional bonus: a bootable CD-ROM. That's right, Apple includes a disc with all the necessary system software ready to go, so if you need to do an install or if you have to boot the machine in an emergency, you don't have to worry about searching for a fistful of floppies that may or may not have gotten corrupted over time.

Table 1: The Centris Line and the Quadra 800 at a Glance

	Centris 610	Centris 650	Quadra 800
List price*	$1,859 (4/80), $2,149 (8/80 with Ethernet), $2,519 (8/230 with Ethernet), $2,959 (8/230 with CD-ROM drive, 1 MB of VRAM, Ethernet)	$2,699 (4/80), $3,189 (8/80 with Ethernet, FPU), $3,559 (8/230 with Ethernet, FPU), $3,999 (8/230 with CD-ROM drive, 1 MB of VRAM, Ethernet, FPU), $5,129 (24/500 with 1 MB of VRAM, Ethernet, FPU)	$4,679 (8/230 with 512K of VRAM), $5,429 (8/500 with 512K of VRAM), $5,869 (8/500 with 1 MB of VRAM, CD-ROM drive), $7,199 (24 MB/1 GB with 1 MB of VRAM)
Dimensions (L x W x H)	16.1 x 15.2 x 3 in.	16.5 x 13 x 6 in.	16 x 7.75 x 14.25 in.
Weight	25 lb	25 lb	25 lb
CPU	20-MHz LC68040	25-MHz 68040	33-MHz 68040
Memory	4 or 8 MB on motherboard, 68 MB maximum	4 or 8 MB on motherboard, 132 MB maximum	8 MB on motherboard, 136 MB maximum
Video	512K of VRAM standard, 1 MB maximum	512K of VRAM standard, 1 MB maximum	512K of VRAM standard, 1 MB maximum
Display support	8-bit, 640 x 480 pixels with 512K of VRAM standard; 16-bit, 832 x 624 pixels (16-inch) with 1 MB of VRAM; 8-bit, 1,152 x 870 pixels (21-inch) with 1 MB of VRAM	8-bit, 640 x 480 pixels with 512K of VRAM standard; 16-bit, 832 x 624 pixels (16-inch) with 1 MB of VRAM; 8-bit, 1,152 x 870 pixels (21-inch) with 1 MB of VRAM	8-bit, 640 x 480 pixels with 512K of VRAM standard; 16-bit, 832 x 624 pixels (16-inch) with 1 MB of VRAM; 8-bit, 1,152 x 870 pixels (21-inch) with 1 MB of VRAM
Interfaces	ADB (2), serial (2), SCSI, PDS	ADB (2), serial (2), SCSI, PDS, NuBus (3)	ADB (2), serial (2), SCSI, PDS, NuBus (3)
Ethernet	optional	optional	standard
Expansion	5.25-inch bay	5.25-inch bay	5.25-inch bay, 3.5-inch bays (2)
FPU	NA	optional	NA
Audio support	stereo audio-out, mono audio-in	stereo audio-out, mono audio-in	stereo audio-out, mono audio-in

*At press time.



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Color to Go:
The PowerBook 165c

Finally, a color PowerBook. But is it the one you've been waiting for?

BY HENRY BORTMAN

When I was a little kid, color TV hadn't been invented. And although sometime around my ascendance to adolescence, color TVs began to populate the living rooms of America, my parents stuck with their black-and-white set till long after I went off to college.

My cousins, however, *did* have color.

I used to love going over to their house. I spent the entire time in front of their TV. I remember watching bright-orange flames burn through the title on "Bonanza." The sparkling palette of colors that Tinkerbell painted onto the screen to announce the beginning of "Walt Disney's Wonderful World of Color." The NBC peacock. I was in awe.

I didn't get quite the same feeling when I saw Apple's PowerBook 165c. It's not that the 165c has a bad-looking display. In fact, it's the best-looking passive-matrix color display I've seen on a notebook computer. It just lacks the pizzazz of animated rainbow fairy dust.

A Colorized PowerBook 180

If the 165c didn't have a color display, it would be a 180. It contains the same processor — a 68030 — running at the same clock speed — 33 megahertz — as the 180 does. The same 68882 math coprocessor, which also runs at 33 megahertz. The same 4 megabytes of pseudostatic RAM, expandable to 14. The same high-density floppy-disk drive. The same 80-megabyte hard-disk drive. (The 180 is optionally sold configured with a 120-megabyte drive, the 165c with a 160-megabyte drive.) It has the same trackball as the 180. The same built-in microphone and speaker. The same set of ports (ADB, modem, printer, SCSI, audio-in, audio-out, video-out) and the same internal RAM-expansion and modem slots. And, with minor styling differences, it has the same size and shape (although it weighs 7 pounds, compared with the 180's 6.8 pounds). The only obvious differences are the screen and the extra circuitry required to drive it (see Figure 1).

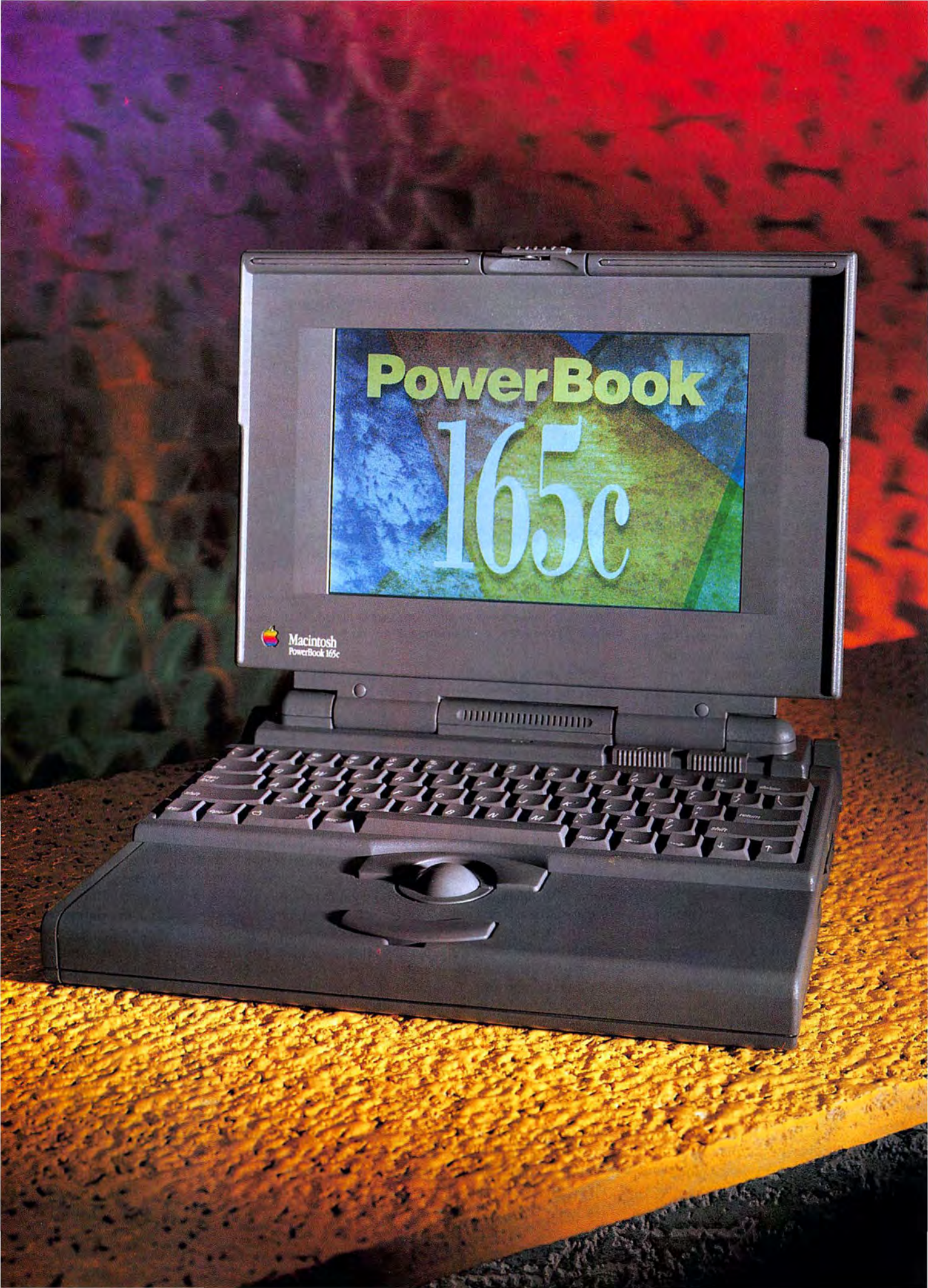
Just Don't Scroll

For the most part, the 165c also performs nearly identically to the 180 (see Figure 2). In our standard battery of PowerBook tests, the 165c performed within a few percentage points of the 180 — an insignificant difference. These results aren't surprising, given that the 165c and the 180 contain identical 33-megahertz 68030 processors and that most of our tests were CPU-intensive.

But there was one glaring exception: In the Word text-scrolling test, our 165c beta unit did terribly. This simple test, unlike the others, focuses on the Mac's ability to redraw its screen display. We opened a ten-page Word document, all in 12-point Times roman type, clicked on the bottom scroll-bar arrow, and timed how long it took to scroll through the entire document. (As each new line of text moves onto the screen, the entire screen must be redrawn.)

The 180 took a bit less than 4 minutes, the 165c nearly 11. Even the PowerBook 160, which performs about 20 percent slower on average than the 180, is nearly as fast

PHOTOGRAPHY: STEVEN UNDERWOOD


PowerBook
165c
Macintosh
PowerBook 165c

as the 180 in the Word text-scrolling test. But our 165c test unit was only about one-third as fast. Why? The main reason is that the 165c must process twice as much information (8 bits of data for each pixel on the screen) as the 180 does (4 bits per pixel). In addition, Apple didn't use dual-port VRAM (video memory) chips on the 165c as it did on the 160 and the 180. The dual-port chips can read data from the CPU and write to the display simultaneously. The standard, single-port DRAM (dynamic RAM) chips Apple used on the 165c cannot do both at the same time.

Although we performed this test with Microsoft Word, it's important to note that what it measured was the speed of the PowerBook 165c's display in general. Every time you open a window, draw a bit-mapped picture on the screen, or perform any other task that is display-intensive, the 165c will seem sluggish.

Figure 1: Inside the PowerBook 165c



Figure 1: To make room for the extra VRAM (video RAM) required to drive a 256-color display, Apple added a "cousinboard" to the PowerBook 165c.

Passive Constraints

Because the 165c *does* have a color screen, you're probably wondering what it looks like. If you've been a Mac user for any length of time, you know that Apple has distinguished itself when it comes to computer displays: They are typically sharp, bright, and as good as technology allows them to be. The 165c's passive-matrix color display is no exception. Having looked at several other passive-matrix color displays, I can tell you unequivocally that you won't find a better one on any other currently shipping notebook computer.

Nevertheless, it has some drawbacks. For one, passive-matrix screens are notorious for a kind of ghosting. If you have a window open on a light background, you see shadows extending in one or more directions beyond the edge of the window. You can also see this to a limited extent on the PowerBook 100, 140, 145, and 160 and the Duo 210 and 230. It's more pronounced on the 165c, although unless the background is a very light color, the effect is still minimal.

The 165c suffers from another classic passive-matrix-display problem as well: When the screen redraws — when you open a new window or scroll — the old screen image fades slowly. When you move the cursor, for example, several cursor afterimages linger on your screen. This effect is most pronounced when you're playing QuickTime movies. As each old image fades and a new one appears, you get a blurry transition. In areas where your movie image changes very slightly (such as an interview subject's shoulder moving just a bit), this sometimes creates an effect that looks like ants marching around. You could live with it if you had to.

My greatest problem with the 165c display, however, is the same as the one I have with Apple's monochrome and gray-scale passive-matrix displays: They need whiter whites. To get the display crisp enough for text editing, I had to turn the brightness up so high that the darker colors got washed out. I will say, in Apple's defense, that the brightness was even, from corner to corner — no dark or bright spots anywhere. And the viewing angle, although more restricted than on previous PowerBooks, was still impressively wide.

Does DOS Do Better?

Disappointed, I took a trip to a large local computer dealer to check out the competition. I figured that most people who *need* color on PowerBooks — and the sooner the better — probably need it so they can see how their color presentations look without having to connect an external monitor. And because PowerPoint and Persuasion, the two leading presentation packages, are both

available for Windows as well as for the Mac, I figured that users might be just as well off saving a little money and going with a passive-matrix color PC notebook.

I figured wrong. The dealer had a Toshiba T1850C passive-matrix color PC notebook computer on display. Its specs are similar to the PowerBook 165c's: It has a 25-megahertz 80386 processor, 4 megabytes of RAM, and an 80-megabyte hard drive, and it weighs 7.3 pounds. The salesperson said it was the best machine of its kind the store's staff had seen.

I'm glad the machines the T1850C outshone weren't on the showroom floor! The T1850C's desktop pattern was all in shades of dark blue and purple. When I changed it to a pale yellow, I knew why the store had chosen darker background colors. It was hideous. I opened a couple of windows, and the whole screen began to look as if it were suffering from some strange disease. Huge, dark, rectangular shadows stretched in every direction, and bright-pink lines extended upward off the left side of each window. I moved a window around on the screen; the shadows and pink lines followed faithfully. Ugh!

The cursor also "echoed" severely. Way worse than on the 165c. If I moved it quickly, I saw as many as a dozen cursors on the screen at once. It was like trying to mouse around in a hall of mirrors. The display was also very uneven. If I adjusted the brightness/contrast (there was only one control) so that the top of the screen was optimal, the bottom was washed out. If I adjusted it so the text on the bottom of the screen was legible, the top was too dark. And the viewing angle was so restricted — half of the screen blacked out if I moved my head just a couple inches off center — that I wished for a neck brace to hold my head steady enough to let me see the whole screen clearly.

I don't want to think about what QuickTime movies would have looked like.

True, the Toshiba T1850C is less expensive. The dealer was selling it for $2,749, around $450 less than what the street price probably will be for a 165c 4/80. But this is one case in which you definitely get what you pay for. Even if I believed that using Windows 3.1 is "just like using a Mac," I would never want to use a display as poor as the T1850C's for daily work.

But then, I wouldn't want to use the 165c's display for daily work either — for the same reason that I use a 180 instead of a 160. It's not for the increased performance. Most of my computer work consists of taking notes, answering E-mail, keeping up my appointment calendar and address book, and writing articles. I could live with a slower machine. But not with a duller screen.

Should You Buy One?

I'd like to be more enthusiastic about the 165c. I'd like it to be the color PowerBook that I've been waiting for. Color would improve the appearance of my desktop. Color-coding would let me instantly distinguish one type of appointment from another in my electronic calendar; 16 shades of gray don't quite do the job. And I wouldn't mind being able to create color dialog boxes and review them on my PowerBook instead of having to switch to a desktop machine to do color work, as I do now.

But I think I'm going to wait a little longer. Rumor has it that Apple is working on an active-matrix color PowerBook, whose display should be nothing short of dazzling. And fast. *That's* the machine I want.

If, however, you are satisfied with Apple's monochrome and gray-scale passive-matrix PowerBook displays — I know several people who *prefer* them over the 180's active-matrix display — but are frustrated by the lack of PowerBook color, the 165c may be just what you're looking for. If you spend a lot of time doing color presentations and simply can't wait for (or can't afford what will undoubtedly be the premium price of) the active-matrix color PowerBook, check out the 165c. You'll be impressed.

Oh yeah, I almost forgot: pricing. The 165c with 4 megabytes of RAM and an 80-megabyte hard-disk drive retails (at press time) for $3,399; the 4/160 model retails for $3,759. Street prices will probably be about 5 to 10 percent lower.

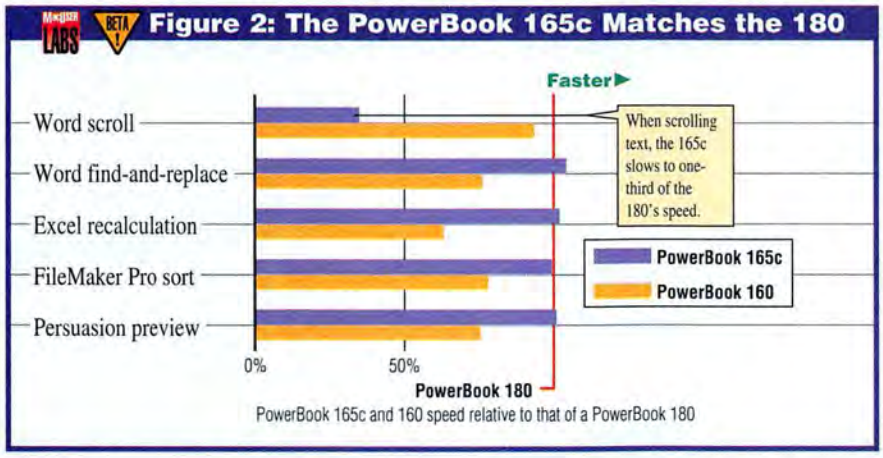


Figure 2: In most tests, the 165c performed almost identically to the 180. The notable exception was the Word text-scrolling test, in which the 165c was only one-third as fast as the 180.

Henry Bortman is *MacUser*'s technical director.


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68030
Plus
68040
Super
Macintosh Classic

Supercharging Your Mac: 100 Accelerated Systems

Don't get left behind. It takes a powerful Mac to handle today's demanding tasks. If yours isn't up to the job, revive it with a high-powered accelerator.

BY SHELLY BRISBIN

Times change. Yesterday's Mac was fast enough for yesterday's software, but today's software — for advanced desktop publishing, complex multimedia presentations, professional image processing, multiplatform database management — demands much more processing power than an older Mac can provide. You can spend a lot of money on a shiny, new, faster Mac, but before you do, consider the alternative: adding a CPU accelerator to your old, not-so-shiny machine.

A CPU accelerator can make your old Mac much faster, thereby increasing your productivity while saving you a bundle. A CPU accelerator won't solve all of your Mac's performance problems, though, and some accelerators carry with them

PHOTOGRAPHY: TOM UPTON

hidden incompatibilities — hidden, that is, until this report, in which we present the results of our exhaustive testing of 100 CPU accelerator/Mac configurations, using 11 Mac models, from the Plus to the IIfx.

Start Your Engines

The CPU (central-processing unit) is both the brains and the brawn of your Mac. It gives orders to the Mac's other components, keeps your software humming, and performs tasks such as adding and multiplying numbers and manipulating images. All Macs use one of four CPUs from Motorola's 68000 family of microprocessors (see the "All in the [68000] Family" sidebar). The higher the CPU's number, the better its capabilities and performance — currently, the 68040 is the top of the line. In addition, each CPU model is available with different clock speeds, measured in *MHz* (megahertz, or millions of operating cycles per second); a higher clock speed typically indicates a faster CPU, so a 50-megahertz 68030 is faster than a 33-megahertz 68030, for example. Generally speaking, however, the model of CPU is a more important determinant of its performance than is its clock speed — in other words, a 33-megahertz 68040 is far faster than a 40-megahertz 68030. Another difference is cost: Higher speed isn't free — a faster CPU costs more.

In addition to the CPU model and its clock speed, your Mac's overall speed depends on other design factors. Macs with 32-bit data paths, such as the IIci, the IIfx, and the Quadras, move more data in the same number of CPU operating cycles than do 16-bit machines such as the Classic II and the LC II. Speed increases for a Mac with a 16-bit data path are therefore limited by the machine's architecture.

Many CPU accelerator boards are designed to work with an FPU (floating-point unit). An FPU is a chip that acts as a coprocessor for the CPU, assisting in noninteger mathematical calculations. If a software program is designed to take advantage of an FPU, the FPU makes a CPU accelerator card even faster. To help you discover how much your Mac's processing speed can be increased by a CPU accelerator, we accelerated a collection of current and discontinued Macs: the Plus, SE, Classic, SE/30, LC, LC II, II, IIcx, IIsi, IIci, and IIfx (see the "How We Tested CPU Accelerators" sidebar). Some accelerators are compatible with multiple platforms, so the total number of accelerated Macs we tested reached 100 — one of the combinations should be right for you.

Most accelerators use a 68030 processor running at 25, 33, 40, or 50 megahertz, although some still use the aging 68000 and a few more use the top-of-the-line 68040. Most 68040 accelerators are intended for NuBus-equipped Macs; only two — one from Fusion Data and one from TechWorks — fit in the LC and the LC II.

Street prices of the accelerators we tested ranged from $225 for the humble but effective Brainstorm Accelerator Plus, for the Plus, to $2,900 for the powerful Fusion Data TokaMac FX, for the IIfx. The degree of acceleration ranged from the subtle boost of the Brainstorm Accelerator Plus to the powerful thrust of the 33-megahertz 68040-based offerings from Applied Engineering, Fusion Data, Radius, and TechWorks. Although many CPU-accelerator boards are aggressively priced, we found that cost doesn't always correspond to performance, and vice versa.

When to Accelerate

There are three good reasons for accelerating your Mac: to increase your productivity, to increase your

How We Tested CPU Accelerators

Testing the performance and compatibility of 100 accelerated-Mac configurations was a gargantuan task. Twelve technicians spent a total of more than 3,000 hours to decide which accelerators were the best value for use on each of 11 Mac models.

MacUser editors and technical staff, along with project leaders and ZD Labs consultants, chose to test accelerator performance by using popular applications for tasks that emphasized real-world conditions: a Microsoft Excel recalculation, a Microsoft Word search-and-replace, an Aldus PageMaker font-change and text-flow; and on color Macs, an Adobe Illustrator preview and an Adobe Photoshop Gaussian blur.

ZD Labs developed automated data-collection procedures for gathering larger quantities of precise performance data, using UserLand Frontier, QuicKeys, and custom applications to automate the testing sequence.

If an accelerator had an optional FPU, we used the FPU. For compatibility testing, we tried to play sounds, format floppy disks, print and copy files over a network, connect with ARA (AppleTalk Remote Access), and perform other timing-dependent tasks. If the accelerator completed these tasks without a glitch, it earned high marks.

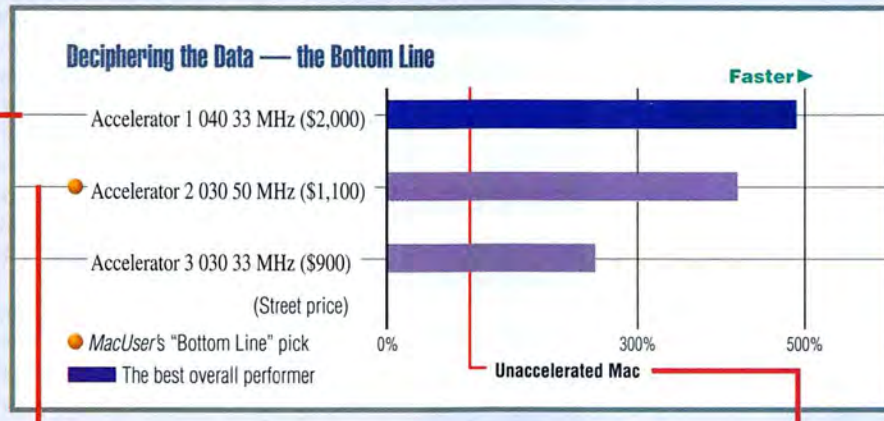
To define an overall-speed value, we used standard statistical methods to calculate the harmonic mean of the tests. Using the harmonic mean allowed us to weight the tests fairly; no single test was given greater statistical importance than any other. We computed the price/performance ratio for each configuration by dividing the street price of the CPU accelerator by the increase in speed of the accelerated Mac over that of the unaccelerated one.

Each Mac was equipped with an Apple 80-megabyte (Quantum LPS 80) hard drive, which was mounted internally, except in the Mac Plus, which cannot accommodate an internal drive. We tested compact Macs with their built-in screens; NuBus Macs were paired with the familiar (recently discontinued) 13-inch AppleColor High-Resolution RGB Monitor.

We tested all the accelerators with System 7.0.1 and Tune-Up 1.1.1. Machines released before the IIci were also tested under System 6.0.7 to gauge the performance impact of switching to System 7. The compact Macs were tested with 4 megabytes of RAM apiece, the LC and LC II were tested with 10 megabytes, and the IIsi and NuBus Macs with 17 megabytes of RAM.

— Max Schireson

We've distilled a mountain of data into a series of charts (see Figures 1 through 11) — one for each of 11 popular Mac models — designed to help you choose the accelerator that's right for you.



For each accelerator, the chart shows the speed of an accelerated Mac relative to that of an unaccelerated Mac. Each accelerator's street price appears alongside its name.

Although the accelerator that provides the fastest speed appears at the top of each chart, it is not necessarily the best all-around value. *MacUser*'s "Bottom Line" pick has a favorable price/performance ratio, no compatibility problems, attractive features, responsive technical support, and superior documentation.

The speed of an unaccelerated Mac is given the value 100 percent.

Figure 1

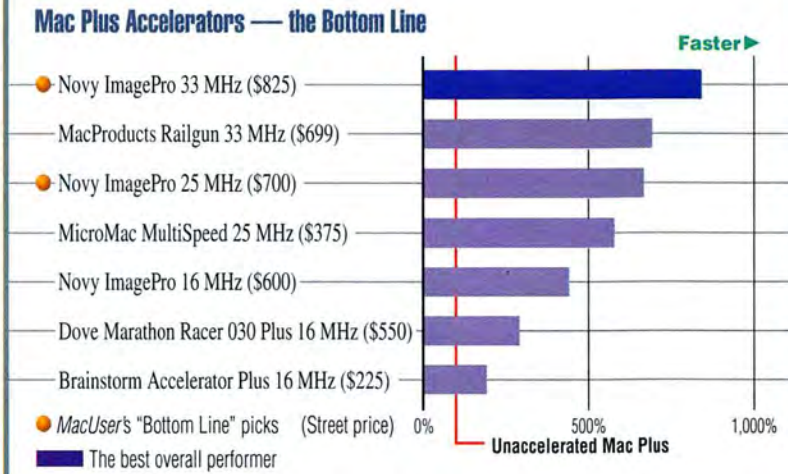


Figure 1: The 68030-based **Novy ImagePro 33 MHz** ($1,095 list, $825 street) provides nearly nine times the speed of an unaccelerated Plus and comes with Novy's excellent technical support. The **Novy ImagePro 25 MHz** ($895 list, $700 street), although offering less of a speed boost than the 33-megahertz model, provides good performance at a great price.

productivity, and to increase your productivity. Adding a CPU accelerator helps you get computationally intensive work done faster and can be a cost-effective alternative to buying a new Mac; an accelerated Mac also gives you the power to use a new generation of software.

If you're working on a Plus, a Classic, or an SE, you have a lot to gain from acceleration. These 68000-based machines — also called compact Macs (along with the Classic II and the SE/30), because of their design — cannot take advantage of such System 7 features as 32-bit addressing and virtual memory, which increases available memory by letting you use hard-disk space in addition to RAM. A 68030-based accelerator can provide support for both.

Also available for the LC are low-priced cards from DayStar, Extreme Systems, and Total Systems that

Figure 2

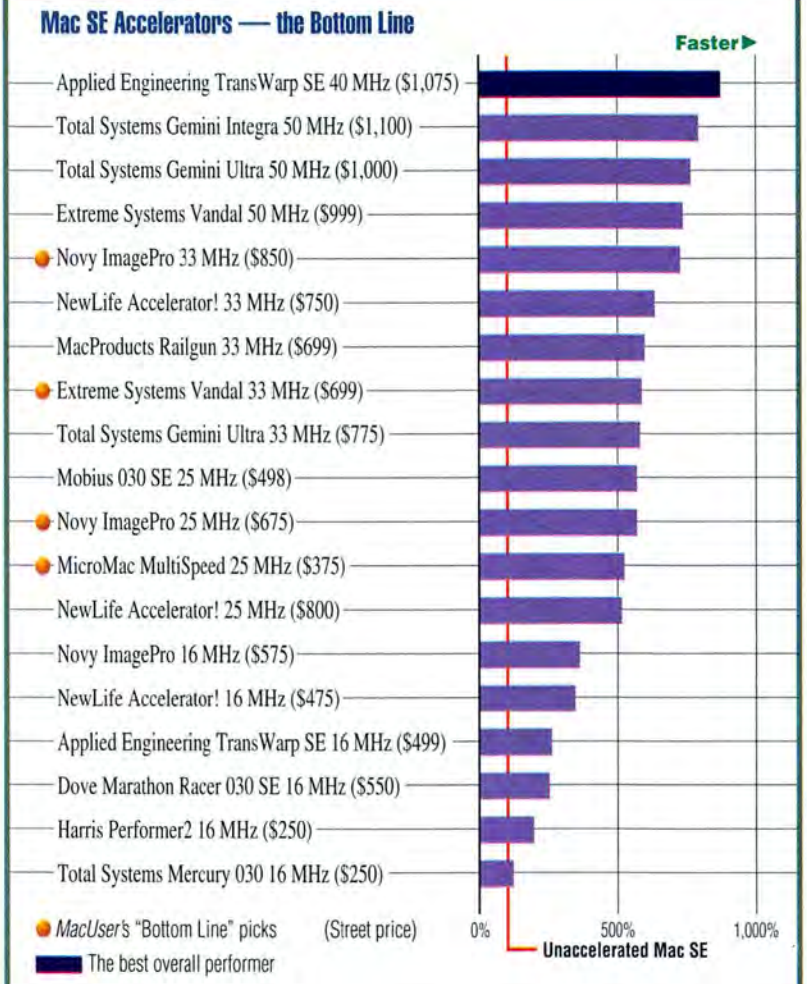


Figure 2: Although several cards provide faster speed, the **Novy ImagePro 33 MHz** ($995 list, $850 street), the **Novy ImagePro 25 MHz** ($795 list, $675 street), and the **Extreme Systems Vandal 33 MHz** ($699 direct) are our favorites. Each offers good performance and good support at a good price. The **MicroMac MultiSpeed 25 MHz** ($375 direct) also deserves mention for offering solid performance at an exceptionally low price. And if you forego the optional FPU, the price drops to an even better $300.

merely replace the LC's 16-megahertz 68020 with a 16-megahertz 68030, thus transforming the LC into an LC II. These cards give you access to virtual memory and 32-bit addressing but provide little or no acceleration — the LC's 16-bit data bus prevents the 68030 from performing as well as it would in a true 32-bit system.

For many owners of compact Macs, a slow machine may not be the only obstacle to productivity. Because a compact Mac's 9-inch screen is inadequate for uses such as desktop publishing, simply speeding up the Macintosh without any gain in screen real estate is only a partial solution. Some vendors therefore offer extended-video capabilities in their accelerators. Extreme Systems (for the SE), Mobius (for the SE and the Classic), and Novy (for the Plus and the SE), to name a few, provide support for large external monitors from Apple and other vendors.

Sometimes a CPU accelerator won't fix what ails your Macintosh. If your biggest complaint is slow scrolling speeds when you use Microsoft Word or Excel or slow zooming speeds when you use QuarkXPress or PageMaker, for example, installing a CPU accelerator won't help much but adding a QuickDraw accelerator will.

If your daily routine demands a lot of hard-disk accesses or big-file transfers — reading from or writing to a database, for example — then a fast hard drive is your best investment. Complex manipulation of 24-bit images demands a lot from your processor, so if you spend your workday with Adobe Photoshop, consider a special-purpose *DSP* (digital signal processor) card, such as the SuperMac ThunderStorm or the Envisio RAGE, which can make some of Photoshop's complex filters run more than 20 times as fast.

The Apple Road

Purchasing a third-party accelerator is not the only way to get a faster CPU into your computer: Apple sells upgrades that transform some Macs into their higher-powered siblings. As this article goes to press, a Classic can be converted to a Classic II, a II or IIx to a IIfx, an LC to an LC II, a IIcx or IIci to a Quadra 700, and a Quadra 900 to a Quadra 950. Owners of the Plus, Classic II, SE, IIsi, and IIfx have no Apple-supplied upgrade path at present.

Apple's upgrades may be more expensive than many third-party CPU-accelerator products, but they have one big advantage: When a favorite application doesn't work properly, you can lay the blame on its publisher. If you install a third-party accelerator and then have problems, it's a good bet that the software publisher will suspect the accelerator and tell you to call its manufacturer. And

All in the (68000) Family

For many "great" Americans — and computers — strong family values can be crucial to success. In the Mac's case, success can be attributed in part to one family of CPUs: Motorola's 68000 microprocessor line. Members of the 68000 family share a fundamental architecture and compatibility, with each new generation offering significant improvements.

The 68000 was the first CPU offered by Motorola in the family of the same name. Used in the Plus, the SE, and the Classic, the 68000 offered a lot — in its day. However, it supports only *24-bit addressing,* a characteristic that limits the maximum amount of RAM in any 68000-based computer to 16 megabytes — and most 68000-based Macs are limited to less than that (see "How to Buy the Right Mac," in *The MacUser 1500* [1993 special issue], page 16).

The 68000 supports clock speeds as high as 16 *megahertz,* or millions of cycles per second (usually abbreviated as *MHz*). The data bus — the path along which data moves, transfers 16 bits of information per read/write access. The wider the data bus, the more data can be sent in a single access. Based on this architecture, the 68000 can execute 1.6 *MIPS* (millions of instructions per second).

The Motorola 68020, introduced in 1982 and used in the II and the LC, boasts 32-bit addressing (accommodating a theoretical 4 gigabytes of RAM) and a maximum clock speed of 33 megahertz. It also includes a 256-byte on-board instruction cache, where frequently used instructions reside for fast access, and a coprocessor interface for adding an optional *FPU* (floating-point unit) math coprocessor. The 68020 can churn out 5.5 MIPS, a significant improvement over the 68000's 1.6 MIPS.

The 68030, introduced in 1984, is found in all other currently shipping Macs except the Quadras. It includes a 256-byte on-board data cache and a 256-byte instruction cache where frequently used data and instructions are kept for fast access and optimum performance. It also allows for a 16-byte *burst mode,* a way of transferring blocks of data very quickly. A 68030 CPU can have one clock speed in the range of 16 to 50 megahertz and is capable of running at 12 MIPS.

The current champion in the 68000 family is the 68040, which includes a 4K on-board data cache, a 4K instruction cache, a built-in FPU, and a 16-byte read/write burst mode. Able to run at a clock speed in the range of 25 to 40 megahertz, the 68040 can execute 22 MIPS.

Motorola is currently working on the 68060. When it becomes available, this 32-bit microprocessor will include several additional on-board caches for increased speed. The 68060 will also take advantage of an underlying parallel architecture that will allow some operations to execute concurrently. The 68060 will allow for concurrent use of caches, controllers, pipelines, and an FPU. Running at a clock speed in the range of 50 to 66 megahertz, the 68060 will provide three times the performance of the 68040, according to Motorola's estimates. Faster clock speeds are expected to be available some time after the chip's introduction. A shipping date for the 68060 is not currently available.

— Stefan B. Lipson

Mac	CPU	Clock speed
Plus	68000	8 MHz
SE	68000	8 MHz
Classic	68000	8 MHz
Classic II	68030	16 MHz
SE/30	68030	16 MHz
LC	68020	16 MHz
LC II	68030	16 MHz
II	68020	16 MHz
IIx	68030	16 MHz
IIcx	68030	16 MHz
IIsi	68030	20 MHz
IIci	68030	25 MHz
IIvx	68030	32 MHz
IIfx	68030	40 MHz
PowerBook 100	68000	16 MHz
PowerBook 140	68030	16 MHz
PowerBook 145	68030	25 MHz
PowerBook 160	68030	25 MHz
PowerBook 170	68030	25 MHz
PowerBook 180	68030	33 MHz
PowerBook Duo 210	68030	25 MHz
PowerBook Duo 230	68030	33 MHz
Quadra 700	68040	25 MHz
Quadra 900	68040	25 MHz
Quadra 950	68040	33 MHz

The brains of every Mac is a CPU from the Motorola 68000 family. Each of the four members of this family is available with one of a variety of *clock speeds.* Generally speaking, the higher the number of the CPU, the more powerful it is, and the higher the clock speed for any one type of CPU, the faster it is.

the publisher may very well be right: Incompatibilities with third-party accelerators are notoriously difficult to resolve. With an Apple upgrade, what you lose in cash, you gain in peace of mind.

Accelerating the Compacts

Installing a CPU accelerator in a compact Mac can be a difficult task; we don't recommend that you do it yourself. To do so, you must avoid contact with delicate — and costly — parts. With some accelerators, you have to solder parts onto the Mac's motherboard. Accelerator vendors recommend that you request dealer installation for all compact Macs. Novy Systems requires you to ship your Plus or SE to it for installation — a good idea, if a bit inconvenient. MicroMac circumvents installation dangers by offering a Plus or SE upgrade that replaces your compact Mac's one-piece case with an LC-like modular-Mac case and an external monitor.

Regardless of which accelerator you choose for your compact Mac, keep in mind that there is a hidden additional cost: the need for faster memory chips. Most accelerators require RAM SIMMs that are rated at

Figure 3

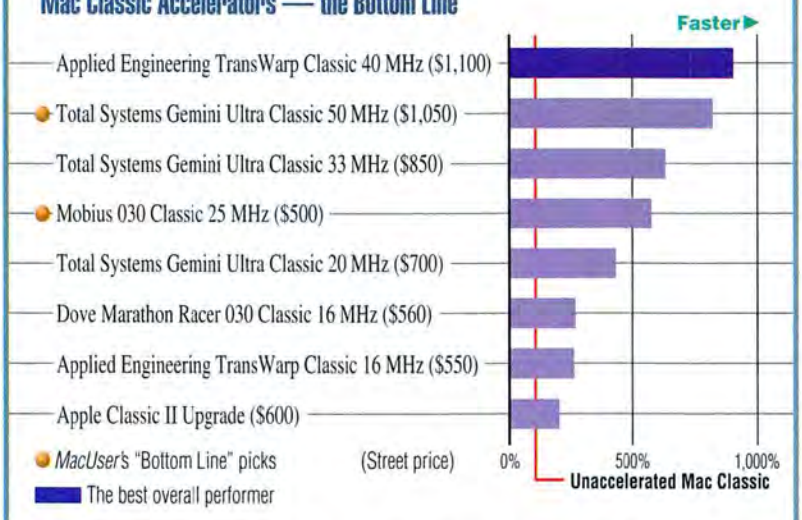


Figure 3: The **Total Systems Gemini Ultra Classic 50 MHz** ($1,789 list, $1,050 street) provides stunning speed, has excellent technical support, and causes no compatibility problems. Although our testing showed the **Mobius 030 Classic 25 MHz** ($548 list, $500 street) to have some incompatibilities with Apple's Sound Manager, it's a great budget choice for your Classic. The Mobius 030 Classic 25 MHz and the Total Systems Gemini Ultra Classic 50 MHz are also available without an FPU.

Figure 4

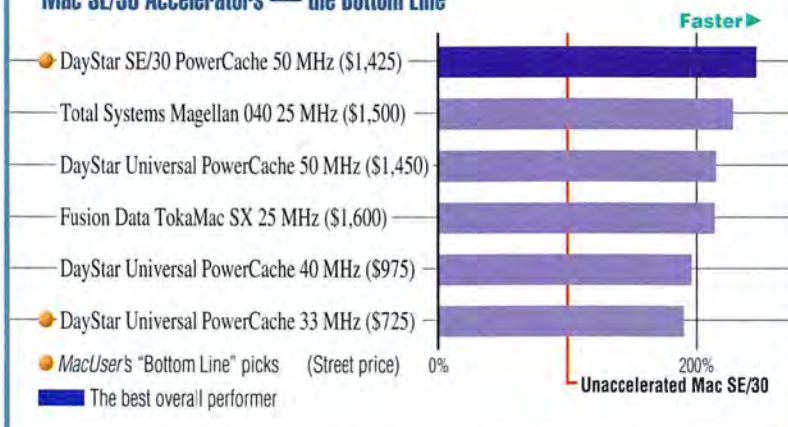


Figure 4: We were most impressed by the **DayStar SE/30 PowerCache 50 MHz** ($1,599 list, $1,425 street), which provided the fastest SE/30 acceleration of all the cards we tested and comes from a company dedicated to service. Although the **DayStar Universal PowerCache 33 MHz** ($799 list, $725 street) provides less acceleration than the other SE/30 accelerators, it offers a great combination of low price, good features, and good technical support. As with the other DayStar accelerator cards, our tests found the Universal PowerCache 33 MHz to be well designed, with no compatibility problems.

80 nanoseconds — significantly faster than the 150-nanosecond SIMMs supplied with the Mac Plus and the 120-nanosecond SIMMs supplied with the Mac SE. As this article went to press, most memory vendors and accelerator manufacturers were selling 1-megabyte 80-nanosecond SIMMs for about $35 to $50 each.

The 25- and 33-megahertz Novy ImagePro accelerators are notable for their use of even faster (53 nanosecond) RAM SIMMs. Although 53-nanosecond RAM chips are a bit more expensive — and harder to find, if you choose not to buy them from Novy — the two Novy accelerators take good advantage of their speed, turning in excellent performance for their class.

Under the Hood

Modular Macs — those designed for easy user expandability — include the LC, LC II, II, IIx, IIcx, IIsi, IIci, and IIfx. All the modular-Mac accelerators we tested consist of boards that either plug directly in to the CPU socket or slip into a NuBus slot, PDS (processor-direct slot), or cache-card expansion slot.

The LC, LC II, and IIsi offer limited expandability, because they each have only one slot — and if you want to install a NuBus or PDS accelerator in a IIsi, you'll need to purchase the appropriate slot adapter. Remember too that once you've filled your machine's single slot, there's no room for additional cards. There are third-party workarounds, however: You can buy dual-slot adapters for the IIsi that provide an additional PDS or purchase the $349 LC MAX, from DGR, of Austin, Texas, which turns the LC's single PDS into three slots and provides a 40-watt power supply and a bay for an additional hard drive.

The II and the IIfx each have six NuBus slots, and the IIcx and the IIci each have three. The IIci also includes a cache-card slot. Mac IIci's sold since October 1991 have shipped

with Apple's IIci cache card, but you can remove this card if you choose an accelerator that plugs in to a cache-card slot.

Speeding Ticket

The faster the speed the CPU accelerator provides, the higher the price, right? Not always. We did find that faster costs more, but we also uncovered some accelerators that, although they didn't produce the greatest speed gains, offered a lower price for their respective speed increases (see Figures 1 through 11). For example, the MicroMac MultiSpeed, a 25-megahertz accelerator for the SE, can increase the SE's speed fivefold for a mere $300 — several cards that provide a bigger speed increase are available, but none are as inexpensive. Although the DayStar Universal PowerCaches for the SE/30, LC, LC II, II, IIcx, IIsi, and IIci provide excellent acceleration, the law of diminishing returns seems to be in effect: The bang for the buck weakens as the PowerCaches become more powerful.

DayStar's accelerators have a unique modular design. A Universal PowerCache can easily be upgraded with a new — and faster — CPU, thus protecting your investment in the card and in its Mac-model-specific adapter. Also, each card includes a socket for an upgraded *ROM* (read-only memory) chip, so as new Macs are introduced, DayStar can quickly support them. In addition, owners of a DayStar accelerator can use the same accelerator in several Mac models simply by using the appropriate adapter.

Hidden Dangers

A CPU accelerator is a complex piece of electronics, and if it's not designed exactly right, it can cause compatibility problems. For example, when we installed the MacProducts Railgun on a Plus, we couldn't format a floppy disk unless we disabled the Railgun. And the Railgun wasn't alone: The Dove

Figure 5

Mac LC Accelerators — the Bottom Line

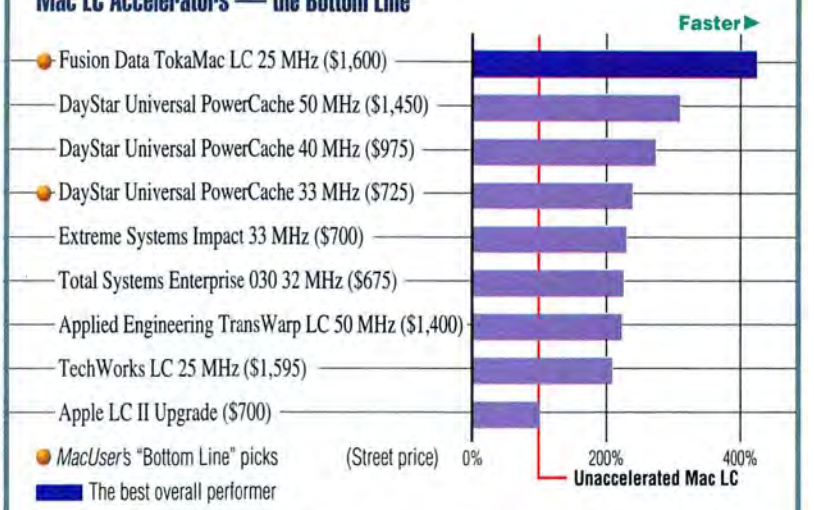


Figure 5: Although expensive, the **Fusion Data TokaMac LC 25 MHz** ($1,695 list, $1,600 street) provides greater speed than any of the other accelerators we tested on the Mac LC. We were also impressed with the more economical **DayStar Universal PowerCache 33 MHz** ($799 list, $725 street), which produces a respectable speed increase, has good features, and comes with good technical support. As with the other DayStar accelerators we tested, we found no compatibility problems with the Universal PowerCache 33 MHz.

Figure 6

Mac LC II Accelerators — the Bottom Line

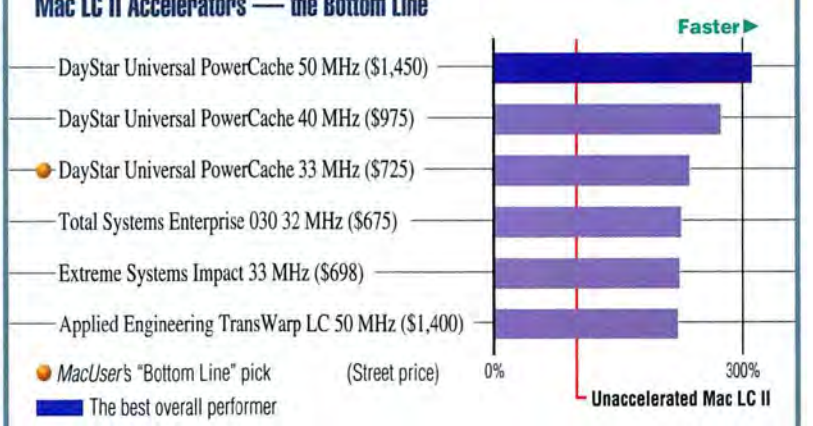


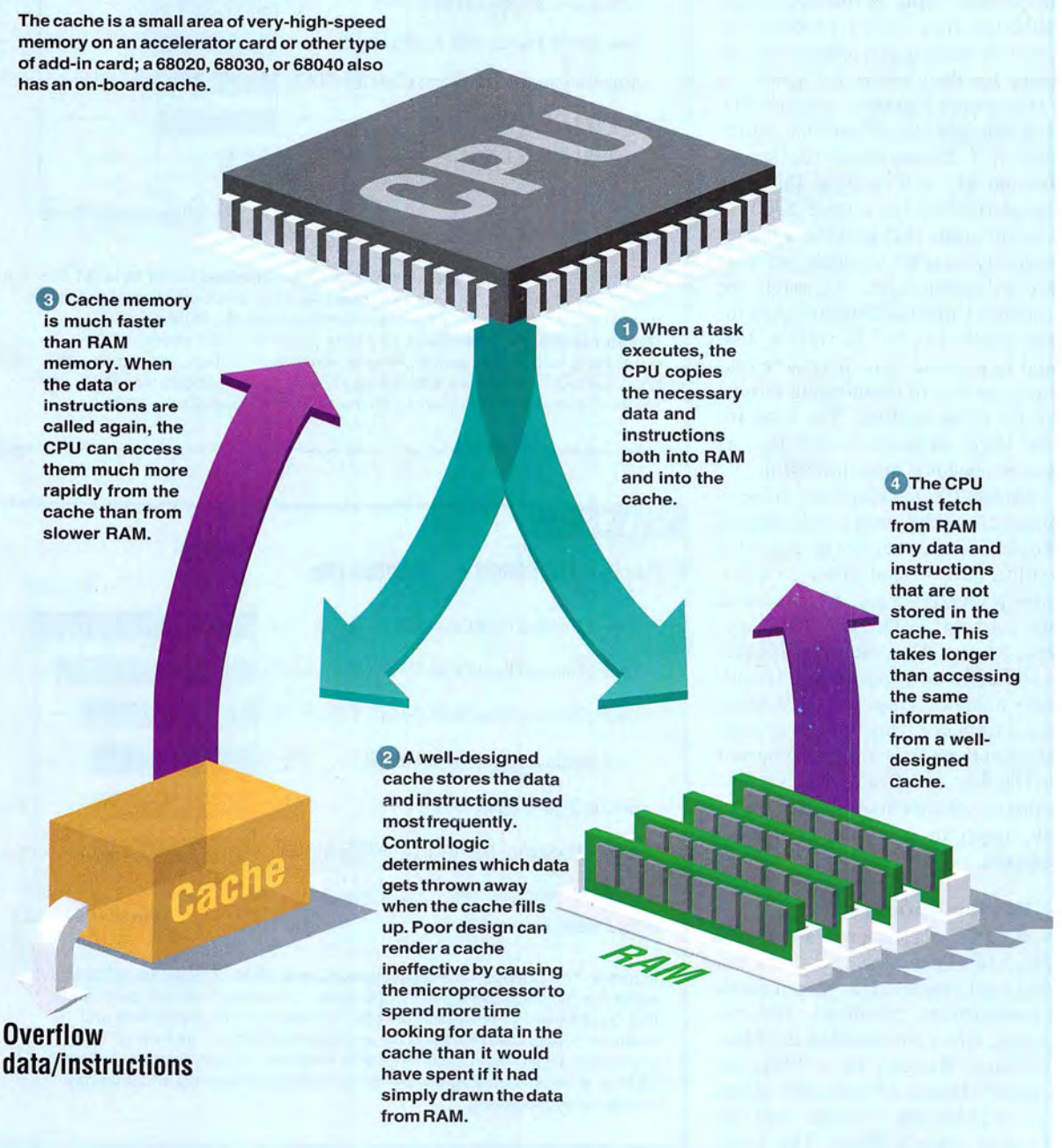
Figure 6: The DayStar **Universal PowerCache 33 MHz** ($799 list, $725 street) earns our recommendation in this category. It's an elegantly designed card that can be used in many different Mac models, it offers good speed and technical support, and it has no compatibility problems — all for a very good price. Like other accelerators from DayStar, the Universal PowerCache 33 MHz is backed by a very respectable three-year warranty and a 30-day money-back guarantee.

Cache: A Good Investment

The speed of your computer is limited not only by how quickly your CPU can process data but also by how quickly it can access the data it needs to process.

Each Mac uses a memory system that provides information to the CPU at approximately the rate at which the CPU can process it. But what happens when you upgrade to a faster CPU? The memory system continues to provide information at the original rate, causing your new CPU to gasp for data from a memory system designed for a less demanding processor.

A *RAM cache,* frequently referred to simply as a *cache,* can alleviate the problem. A cache is a small amount of high-speed memory designed to hold frequently used information for fast access. The result: Your high-powered CPU can reach top speed.



Marathon Racer 030 Plus and the Total Systems Mercury 030 caused the same problem.

Accelerator compatibility problems arose the most frequently when we attempted to use ARA (AppleTalk Remote Access), the excellent connectivity software from Apple that lets you dial in to a remote AppleTalk network and work as if you were just another node on the network. Many accelerated Macs were unable to access resources such as printers from the Chooser when connected to a remote network.

Even worse, when we installed the 25- and 33-megahertz Applied Engineering 68040 accelerators and the 33-megahertz TechWorks NuBus 040, we were sometimes unable to establish any ARA connection at all with a remote AppleTalk network. For those who don't telecommute, this is not a problem; for those who do or plan to in the future, these problems are significant. (Even when not connected to the network via ARA, a Plus accelerated with a Dove Marathon Racer 030 Plus or with a 25-megahertz Novy ImagePro couldn't display our LaserWriter in the Chooser.)

If you work with sound, be aware that sound also proved a problem for some accelerators. In the worst cases (with Applied Engineering's 40-megahertz SE and Classic products), garbled sound was followed by a system crash. The Radius Rockets (which run on NuBus platforms) suffered sound problems as well — specifically with Sound Manager — that froze the computer until we pressed the Command-period key combination. All the Dove accelerators, the Harris Performer2 on the SE, the MicroMac MultiSpeed on the SE, and the Mobius 030 Classic also experienced some degree of trouble with sound.

Strong Supporters

Good support is crucial when incompatibilities arise. When you buy a CPU accelerator, you're buying

Figure 7

Mac II Accelerators — the Bottom Line

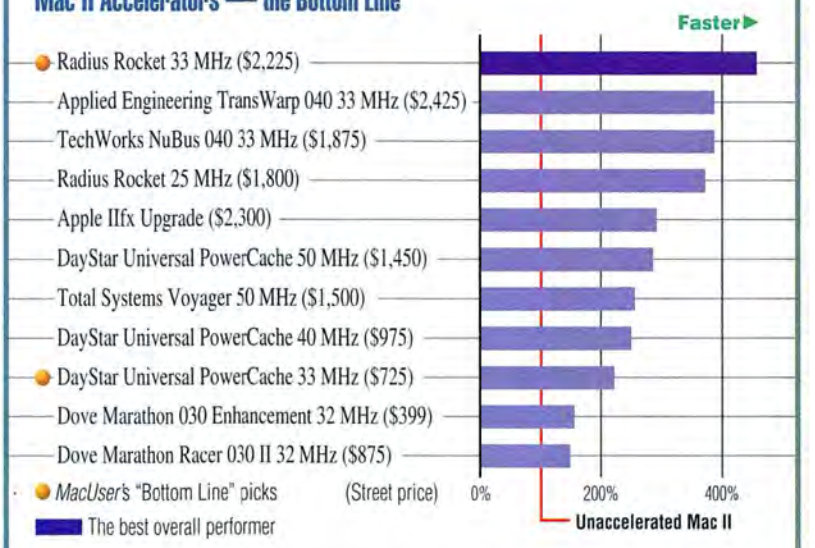


Figure 7: A lot of options are available for the Mac II, the pioneer of NuBus expandability. Our choice, the **Radius Rocket 33 MHz** ($2,499 list, $2,225 street), offers an impressive speed boost at a fair price. Again, we were impressed by the **DayStar Universal PowerCache 33 MHz** ($799 list, $725 street), which has excellent technical support and very good performance for the price.

Figure 8

Mac IIcx Accelerators — the Bottom Line

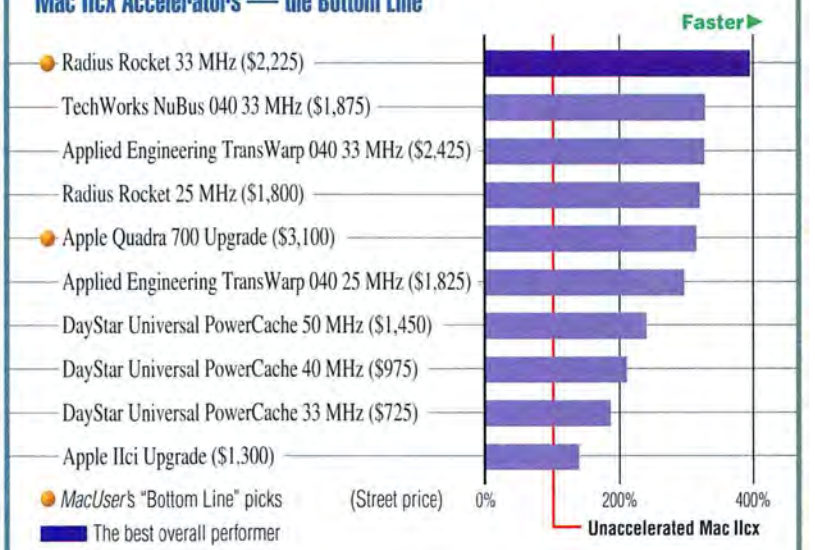


Figure 8: If all-out speed is what you need — and sound-compatibility problems don't concern you — go with the **Radius Rocket 33 MHz** ($2,499 list, $2,225 street). For the utmost in compatibility, the **Apple Quadra 700 Upgrade** ($3,129 list, $3,100 street) can turn an aging IIcx into a Mac for the '90s.

Figure 9

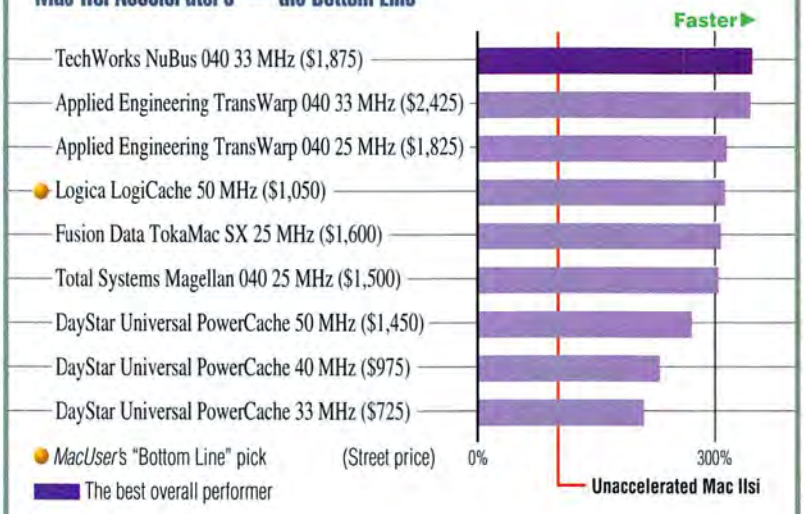


Figure 9: The **Logica LogiCache 50 MHz** ($1,199 list, $1,050 street) is the kind of product we like to review. Our one and only pick for the IIsi, this accelerator card offers more bang for the buck than anything else in its class, providing good features as well as excellent technical support — at an excellent price.

more than just a piece of hardware; you need to know what kind of support the vendor will provide if and when problems occur.

For a quick indication of the kind of support you can expect, check the warranty. Most accelerators include a 15- or 30-day money-back guarantee plus an extended warranty on workmanship. The shortest warranty we came upon was one year, whereas Harris and TechWorks instill confidence by providing a lifetime warranty.

To gauge the kind of after-sale service you can expect, we called vendors (see Table 1) and — without revealing our true identities — asked common installation and troubleshooting questions about their respective products. We placed multiple calls on multiple days to reduce the chances of error, and we evaluated the vendors not only on the accuracy of their answers but also on how often we encountered busy signals, how much time we spent on hold, and how promptly vendors returned messages left on their answering machines.

Dove was the biggest disappointment. We called its technical-support line more than 30 times during the course of a week, encountering many busy signals and leaving many messages on an answering machine — not once did anyone from the company call us back, and when we finally got through, we were given incorrect information.

Applied Engineering's technical-support services were not up to par either (the technicians answered some questions incorrectly and were

Table 1: Rating Tech Support

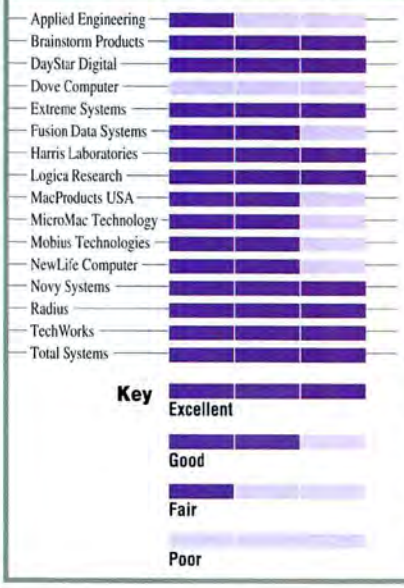


Table 1: To evaluate the quality of a vendor's technical support, we called repeatedly over a period of several weeks. Each rating is based on the time it took the vendor to respond to our calls, the number of calls required to elicit a response, and the accuracy of the responses to two of our questions.

Table 2 Criteria

List price — The manufacturer's suggested retail price. (Because of recent price reductions by Motorola, list and street prices should be significantly lower when this article appears.)
Street price — The average price charged by dealers in the continental U.S. or the price charged by vendors that sell direct, as of December 1992.
CPU — The type of central-processing unit or microprocessor the accelerator uses.
CPU clock speed — The frequency at which the CPU can process data, in megahertz.
FPU — Does the accelerator contain a floating-point unit, a coprocessor designed to assist the CPU in performing some math-intensive calculations?
Extended video — Does the accelerator provide support for an external monitor?
Installation method — How the accelerator is installed.
Platforms tested — The Mac models with which we tested the accelerator.
Warranty, guarantee — The length of time for which the accelerator's manufacturer guarantees the card against faulty workmanship or defects and the length of the money-back guarantee, if any.

Figure 10

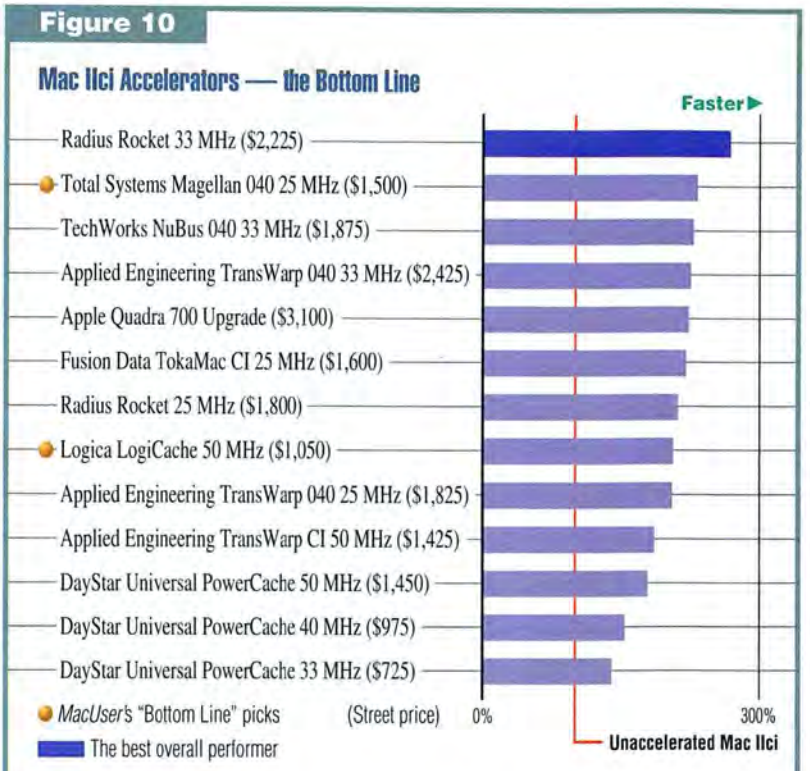


Figure 10: We discovered several good accelerators for the IIci, but we unhesitatingly chose the **Logica LogiCache 50 MHz** ($1,199 list, $1,050 street), which offers greater speed for a lower price than any other product on any platform. If you need even greater speed — and you have more cash — another excellent choice is the **Total Systems Magellan 040 25 MHz** ($2,999 list, $1,500 street). The Magellan was one of the best performers with the IIci, and Total Systems offers excellent technical support.

difficult to reach by phone), but they were better than those offered by Dove. On the other hand, we gave high marks to DayStar, Extreme Systems, Logica, Novy, Radius, TechWorks, and Total Systems for providing prompt and accurate responses to all of our questions.

The Finish Line

Every Mac user wants more speed at the lowest possible price. CPU accelerators can give you that speed, sometimes at a very low price. There may be some strings attached, however: incompatibilities with new software releases and even with some system software. Speed is useless if your Mac can no longer perform the tasks you need it for. Although many accelerators do not cause compatibility problems, Apple may introduce a system upgrade that causes your accelerator to hiccup, or your favorite publisher may upgrade your most essential application in a manner that renders it incompatible with your accelerator.

But the risk is minimal. Chances are that an accelerator that's compatible with your system today will be compatible with it tomorrow. If you need the power of a new Macintosh but you don't want to pay for a new one, a CPU accelerator — carefully chosen — can solve your speed problem and increase your productivity. Incompatibility warnings should be helpful in choosing an accelerator, but your best bet is to give any accelerator you're considering a test drive first — and not just at a dealer's showroom. Take advantage of the money-back guarantees many vendors offer, and put the accelerator through its paces in your own office or home, running the applications you normally use while hooked up to all of your usual peripherals. And don't be shy; ask questions as they arise. With any luck, you'll discover an economical way to move up to the applications of the '90s.

Shelly Brisbin is a *MacUser* associate editor who finds that installing an accelerator does not speed up the writing process. Max Schireson, a ZD Labs project leader, directed the ZD Labs test effort with help from ZD Labs consultant Peter Baum. Jeffy Milstead, a *MacUser* project leader, acted as technical liaison.

Figure 11

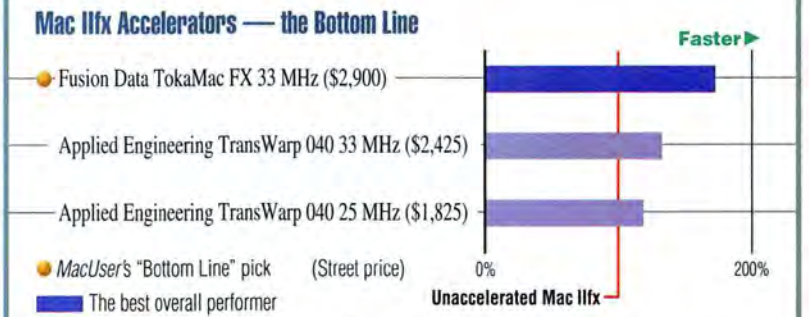


Figure 11: The once-ruling IIfx can be elevated to Quadra 950 speed with a **Fusion Data TokaMac FX 33 MHz** ($3,195 list, $2,900 street). Although it's expensive, this card offers an excellent performance boost.

continues ▶

Table 2: Features of CPU Accelerators

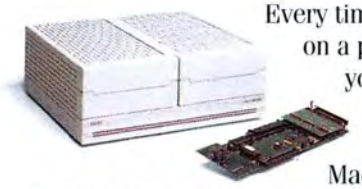
	Mac Plus				
	Brainstorm Accelerator Plus 16 MHz ↕↕↕	**Dove Marathon Racer 030 Plus 16 MHz** ↕↕	**MacProducts Railgun 33 MHz** ↕↕↕	**MicroMac MultiSpeed 25 MHz** ↕↕↕½	**Novy ImagePro 16 MHz** ↕↕↕½
List price	$249	$898 with FPU, $599 with no FPU	$699 with FPU, $650 without FPU	$375 with FPU, $300 without FPU	$795
Street price	$225	$550 with FPU, $325 without FPU	$699 with FPU (direct), $650 without FPU (direct)	$375 with FPU (direct), $300 without FPU (direct)	$600
Pros	Inexpensive. No added strain on power supply. Good tech support.		Good price/ performance ratio.	Optional LC-like case.	Good tech support.
Cons	Not fully compatible with ARA.	Not fully compatible with ARA and Sound Manager. Unresponsive tech support.	Cannot format a floppy disk when accelerator is active.	Not fully compatible with Sound Manager.	Not fully compatible with ARA.
CPU	68000	68030	68030	68030	68030
CPU clock speed	16 MHz	16 MHz	33 MHz	25 MHz	16 MHz
FPU	no	optional	optional	optional	yes
Extended video	no	optional	no	optional	yes
Installation method	motherboard modification	clip on	clip on	clip on	clip on
Platforms tested	Plus	Plus	Plus	Plus, SE	Plus
Warranty, guarantee	1 year, none	1 year, none	1 year, 30 days	1 year, 30 days	2 years, 30 days
Company	Brainstorm Products 1145 Terra Bella Ave. Mountain View, CA 94043 415-964-2131	Dove Computer Corp. 1200 N. 23rd St. Wilmington, NC 28405 800-849-3297 919-343-5600	MacProducts USA, Inc. 608 W. 22nd St. Austin, TX 78705 800-622-3475 512-472-8881	MicroMac Technology 2711 Aliso Creek Rd. Ste. 145 Aliso Viejo, CA 92656 714-362-1000	Novy Systems, Inc. 1862 Fern Palm Dr. Edgewater, FL 32141 800-553-2038 904-427-2358

	Mac Plus		Mac SE		
	Novy ImagePro 25 MHz ↕↕↕½	**Novy ImagePro 33 MHz** ↕↕↕↕½	**Applied Engineering TransWarp SE 16 MHz** ↕↕½	**Applied Engineering TransWarp SE 40 MHz** ↕↕↕	**Dove Marathon Racer 030 SE 16 MHz** ↕↕
List price	$895	$1,095	$499 with FPU, $412 without FPU	$1,085 with FPU, $999 without FPU	$898 with FPU, $599 without FPU
Street price	$700	$825	$499 with FPU, $400 without FPU	$1,075 with FPU, $925 without FPU	$550 with FPU, $400 without FPU
Pros	Good price/performance ratio. Good tech support.	Fastest Plus acceleration. Good tech support.		Fastest SE acceleration. Good price/ performance ratio.	
Cons	Not fully compatible with ARA.	Not fully compatible with ARA.	Not fully compatible with Sound Manager.	Not fully compatible with Sound Manager.	Poor price/performance ratio. Unresponsive tech support.
CPU	68030	68030	68030	68030	68030
CPU clock speed	25 MHz	33 MHz	16 MHz	40 MHz	16 MHz
FPU	yes	yes	optional	optional	optional
Extended video	yes	yes	yes	yes	optional
Installation method	clip on	clip on	clip on	clip on	clip on
Platforms tested	Plus	Plus	SE	SE	SE
Warranty, guarantee	2 years, 30 days	2 years, 30 days	1 year, 15 days	1 year, 15 days	1 year, none
Company	Novy Systems, Inc. 1862 Fern Palm Dr. Edgewater, FL 32141 800-553-2038 904-427-2358	Novy Systems, Inc. 1862 Fern Palm Dr. Edgewater, FL 32141 800-553-2038 904-427-2358	Applied Engineering P.O. Box 5100 Carrollton, TX 75011 214-241-6060	Applied Engineering P.O. Box 5100 Carrollton, TX 75011 214-241-6060	Dove Computer Corp. 1200 N. 23rd St. Wilmington, NC 28405 800-849-3297 919-343-5600

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Table 2: Features of CPU Accelerators, continued

	Mac SE				
	Extreme Systems Vandal 33 MHz ★★★★	**Extreme Systems Vandal 50 MHz** ★★★½	**Harris Performer2 16 MHz** ★★★	**MacProducts Railgun 33 MHz** ★★★½	**MicroMac MultiSpeed 25 MHz** ★★★½
List price	$699	$999	$250	$699 with FPU, $599 without FPU	$375 with FPU, $300 without FPU
Street price	$699 (direct)	$999 (direct)	$250	$699 with FPU (direct), $599 without FPU (direct)	$375 with FPU (direct), $300 without FPU (direct)
Pros	Good price/performance ratio. Good tech support.	Fast acceleration. Good tech support.	Good tech support.	Good price/ performance ratio.	Good price/performance ratio. Optional LC-like case.
Cons		Not fully compatible with ARA.	Not fully compatible with Sound Manager.		Not fully compatible with Sound Manager.
CPU	68030	68030	68000	68030	68030
CPU clock speed	33 MHz	50 MHz	16 MHz	33 MHz	25 MHz
FPU	yes	yes	yes	optional	optional
Extended video	yes	yes	yes	no	no
Installation method	clip on	clip on	PDS slot	clip on	clip on
Platforms tested	SE	SE	SE	SE	Plus, SE
Warranty, guarantee	3 years, 30 days	3 years, 30 days	lifetime, none	1 year, 30 days	1 year, 30 days
Company	Extreme Systems 1050 Industry Dr. Tukwila, WA 98188 800-995-2334 206-575-2334	Extreme Systems 1050 Industry Dr. Tukwila, WA 98188 800-995-2334 206-575-2334	Harris Laboratories, Inc. 7379 Washington Ave. S. Edina, MN 55439 800-783-3726 612-941-2948	MacProducts USA, Inc. 608 W. 22nd St. Austin, TX 78705 800-622-3475 512-472-8881	MicroMac Technology 2711 Aliso Creek Rd. Ste. 145 Aliso Viejo, CA 92656 714-362-1000

	Mac SE				
	Mobius 030 SE 25 MHz ★★★★	**NewLife Accelerator! 16 MHz** ★★★	**NewLife Accelerator! 25 MHz** ★★★	**NewLife Accelerator! 33 MHz** ★★★	**Novy ImagePro 16 MHz** ★★★½
List price	$498 with FPU, $399 without FPU	$499	$849	$895	$695
Street price	$498 with FPU, $399 without FPU	$475	$800	$750	$575
Pros	Good price/ performance ratio.				Good tech support.
Cons					
CPU	68030	68030	68030	68030	68030
CPU clock speed	25 MHz	16 MHz	25 MHz	33 MHz	16 MHz
FPU	optional	optional	optional	yes	yes
Extended video	yes	optional	optional	no	yes
Installation method	clip on	PDS slot	PDS slot	PDS slot	PDS slot
Platforms tested	SE	SE	SE	SE	SE
Warranty, guarantee	5 years, 30 days	2 years, none	2 years, none	2 years, none	2 years, 30 days
Company	Mobius Technologies, Inc. 5835 Doyle St. Emeryville, CA 94608 800-523-7933 510-654-0556	NewLife Computer Corp. 99 Michael Cowpland Dr. Unit #101 Kanata, ON K2M 1X3 Canada 800-663-6395 613-592-5080	NewLife Computer Corp. 99 Michael Cowpland Dr. Unit #101 Kanata, ON K2M 1X3 Canada 800-663-6395 613-592-5080	NewLife Computer Corp. 99 Michael Cowpland Dr. Unit #101 Kanata, ON K2M 1X3 Canada 800-663-6395 613-592-5080	Novy Systems, Inc. 1862 Fern Palm Dr. Edgewater, FL 32141 800-553-2038 904-427-2358

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OTHER 040'S	DAYSTAR'S TURBO 040	
NO	**YES**	Plug In and Startup (No System Install)
NO	**YES**	Saves NuBus Slots For Other Boards
NO	**YES**	Compatible With All Video Cards
NO	**YES**	Supports Non-NuBus Macs
NO	**YES**	Compatible With All QuickDraw Accelerators
NO	**YES**	Optional 128K Cache For More Speed
NO	**YES**	Compatible With Apple Virtual Memory
NO	**YES**	Low Cost, No Penalty Upgrades
NO	**YES**	Compatible With Apple A/ROSE† Cards
NO	**YES**	Does Not Require Additional Memory
NO	**YES**	Compatible With Apple QuickTime
NO	**YES**	Free Storm PicturePress 2.5 Software
NO	**YES**	Compatible With AppleTalk Remote Access
NO	**YES**	Full AppleTalk/EtherTalk Network Support
NO	**YES**	Compatible With Apple MIDI
NO	**YES**	Full-Color Installation/User Manuals
NO	**YES**	Compatible With All Sound Applications
NO	**YES**	3 Year Warranty & Toll-Free Tech Support
NO	**YES**	Compatible With All Scanners
NO	**YES**	Compatible With Apple's "Installer" Application
90	**0**	Total Number of Compatibility Problems*

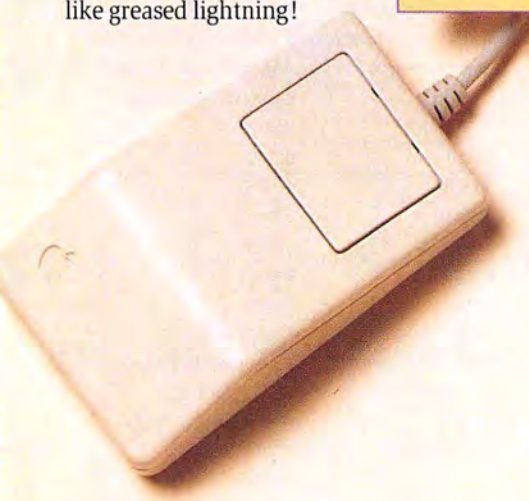
* Does not include Apple GC Card which requires the user to turn off data caching while running video acceleration

† A/ROSE- Apple Real Time Operating System Environment includes Apple Coax/Twinax Card, Ethernet NB Card, MacAPPC, MACDFT, MCP Card, Serial NB Card, SNA.PS, TokenTalk NB Card

DayStar's PowerCache '030 accelerators have won nearly every editorial award in the USA, Europe and Japan. They set the standard for what an accelerator should be – fast as lightning and as compatible as Apple.

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The Turbo 040 has a built in math chip and is available in two speeds – 25 MHz and 33 MHz. Like the Quadra, the Turbo '040 also has an optional 128K cache card to squeeze out every bit of power.

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With DayStar you can be an expert at working on your Mac, not making your Mac work. The Turbo 040, like the PowerCache, plugs directly into the Mac through the processor direct slot. Therefore, it's faster, you don't waste NuBus slots, and you don't have to buy or move your memory. The Turbo 040 is a breeze to install and operate – just plug it in and turn it on!

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Table 2: Features of CPU Accelerators, continued

	Mac SE				
	Novy ImagePro 25 MHz ↕↕↕↕½	**Novy ImagePro 33 MHz** ↕↕↕↕½	**Total Systems Gemini Integra 50 MHz** ↕↕↕↕	**Total Systems Gemini Ultra 33 MHz** ↕↕↕½	**Total Systems Gemini Ultra 50 MHz** ↕↕↕½
List price	$795	$995	$1,893	$1,579 with FPU, $1,419 without FPU	$1,789 with FPU, $1,589 without FPU
Street price	$675	$850	$1,100	$775 with FPU, $675 without FPU	$1,000 with FPU, $900 without FPU
Pros	Good price/performance ratio. Good tech support.	Good price/performance ratio. Good tech support.	Fast acceleration. Good tech support.	Good tech support.	Fast acceleration. Good tech support.
Cons					
CPU	68030	68030	68030	68030	68030
CPU clock speed	25 MHz	33 MHz	50 MHz	33 MHz	50 MHz
FPU	yes	yes	yes	optional	optional
Extended video	yes	yes	optional	optional	optional
Installation method	PDS slot	PDS slot	PDS slot	PDS slot	PDS slot
Platforms tested	SE	SE	SE	SE	SE
Warranty, guarantee	2 years, 30 days	2 years, 30 days	2 years, none	2 years, none	2 years, none
Company	Novy Systems, Inc. 1862 Fern Palm Dr. Edgewater, FL 32141 800-553-2038 904-427-2358	Novy Systems, Inc. 1862 Fern Palm Dr. Edgewater, FL 32141 800-553-2038 904-427-2358	Total Systems 1720 Willow Creek Cir. Eugene, OR 97402 800-874-2288 503-345-7395	Total Systems 1720 Willow Creek Cir. Eugene, OR 97402 800-874-2288 503-345-7395	Total Systems 1720 Willow Creek Cir. Eugene, OR 97402 800-874-2288 503-345-7395

	Mac SE	Mac Classic			
	Total Systems Mercury 030 16 MHz ↕↕	**Apple Classic II Upgrade** ↕↕↕½	**Applied Engineering TransWarp Classic 16 MHz** ↕↕½	**Applied Engineering TransWarp Classic 40 MHz** ↕↕↕	**Dove Marathon Racer 030 Classic 16 MHz** ↕↕
List price	$499 with FPU, $409 without FPU	$629	$586 with FPU, $499 without FPU	$1,198 with FPU, $953 without FPU	$898 with FPU, $599 without FPU
Street price	$250 with FPU, $200 without FPU	$600	$550 with FPU, $450 without FPU	$1,100 with FPU, $900 without FPU	$560 with FPU, $500 without FPU
Pros	Good tech support.	Full compatibility.		The fastest Classic acceleration. Good price/performance ratio.	
Cons	Cannot format a floppy disk when accelerator is active.	Slowest Classic acceleration.	Poor price/performance ratio.	Not fully compatible with Sound Manager.	Not fully compatible with ARA and Sound Manager. Cannot format a floppy disk.
CPU	68030	68030	68030	68030	68030
CPU clock speed	16 MHz	16 MHz	16 MHz	40 MHz	16 MHz
FPU	optional	no	optional	optional	optional
Extended video	optional	NA	NA	NA	optional
Installation method	PDS slot	new logic board and case	clip on	clip on	clip on
Platforms tested	SE	Classic	Classic	Classic	Classic
Warranty, guarantee	2 years, none	1 year, none	1 year, 15 days	1 year, 15 days	1 year, none
Company	Total Systems 1720 Willow Creek Cir. Eugene, OR 97402 800-874-2288 503-345-7395	Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014 800-538-9696 408-996-1010	Applied Engineering P.O. Box 5100 Carrollton, TX 75011 214-241-6060	Applied Engineering P.O. Box 5100 Carrollton, TX 75011 214-241-6060	Dove Computer Corp. 1200 N. 23rd St. Wilmington, NC 28405 800-849-3297 919-343-5600

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Table 2: Features of CPU Accelerators, continued

	Mac Classic				Mac SE/30
	Mobius 030 Classic 25 MHz ↕↕↕↕	**Total Systems Gemini Ultra Classic 20 MHz** ↕↕↕½	**Total Systems Gemini Ultra Classic 33 MHz** ↕↕↕½	**Total Systems Gemini Ultra Classic 50 MHz** ↕↕↕↕	**DayStar SE/30 PowerCache 50 MHz** ↕↕↕½
List price	$548 with FPU, $449 without FPU	$1,189 with FPU, $1,099 without FPU	$1,579 with FPU, $1,419 without FPU	$1,789 with FPU, $1,589 without FPU	$1,599 with FPU, $1,299 without FPU
Street price	$500 with FPU, $449 without FPU	$700 with FPU, $650 without FPU	$850 with FPU, $750 without FPU	$1,050 with FPU, $950 without FPU	$1,425 with FPU, $1,150 without FPU
Pros	Good price/performance ratio.	Good tech support.	Good tech support.	Fast acceleration. Good tech support.	Fastest SE/30 acceleration. Well designed. Good tech support.
Cons	Not fully compatible with Sound Manager.	Below average price/performance ratio.			
CPU	68030	68030	68030	68030	68030
CPU clock speed	25 MHz	20 MHz	33 MHz	50 MHz	50 MHz
FPU	optional	optional	optional	optional	optional
Extended video	yes	optional	optional	optional	no
Installation method	clip-on	clip-on	clip-on	clip-on	CPU socket
Platforms tested	Classic	Classic	Classic	Classic	SE/30
Warranty, guarantee	5 years, 30 days	2 years, none	2 years, none	2 years, none	3 years, 30 days
Company	MobiusTechnologies, Inc. 5835 Doyle St. Emeryville, CA 94608 800-523-7933 510-654-0556	Total Systems 1720 Willow Creek Cir. Eugene, OR 97402 800-874-2288 503-345-7395	Total Systems 1720 Willow Creek Cir. Eugene, OR 97402 800-874-2288 503-345-7395	Total Systems 1720 Willow Creek Cir. Eugene, OR 97402 800-874-2288 503-345-7395	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077

	Mac SE/30				
	DayStar Universal PowerCache 33 MHz ↕↕↕↕	**DayStar Universal PowerCache 40 MHz** ↕↕↕½	**DayStar Universal PowerCache 50 MHz** ↕↕↕½	**Fusion Data TokaMac SX 25 MHz** ↕↕↕	**Total Systems Magellan 040 25 MHz** ↕↕↕½
List price	$799 with FPU, $649 without FPU	$1,099 with FPU, $899 without FPU	$1,599 with FPU, $1,299 without FPU	$1,695	$2,999
Street price	$725 with FPU, $575 without FPU	$975 with FPU, $800 without FPU	$1,450 with FPU, $1,150 without FPU	$1,600	$1,500
Pros	Well designed. Works on many Macs. Good tech support.	Well designed. Works on many Macs. Good tech support.	Fast acceleration. Good tech support.		Fast acceleration. Good tech support.
Cons					Expensive.
CPU	68030	68030	68030	68040	68040
CPU clock speed	33 MHz	40 MHz	50 MHz	25 MHz	25 MHz
FPU	optional	optional	optional	yes	yes
Extended video	no	no	no	no	no
Installation method	PDS slot	PDS slot	PDS slot	PDS slot	PDS slot
Platforms tested	SE/30, LC, LC II, II, IIcx, IIsi, IIci	SE/30, LC, LC II, II, IIcx, IIsi, IIci	SE/30, LC, LC II, II, IIcx, IIsi, IIci	SE/30	SE/30, IIsi, IIci
Warranty, guarantee	3 years, 30 days	3 years, 30 days	3 years, 30 days	1 year, 30 days	2 years, none
Company	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	Fusion Data Systems 8920 Business Park Dr. Ste. 350 Austin, TX 78759 800-285-8313 512-338-5326	Total Systems 1720 Willow Creek Cir. Eugene, OR 97402 800-874-2288 503-345-7395

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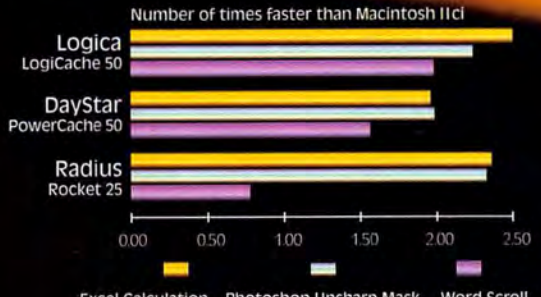
The LogiCache 50MHz '030 Accelerator.

You can't buy a faster, more powerful accelerator for the money. Benchmark tests show that the LogiCache Accelerator out-performs DayStar's PowerCache 50MHz by up to 30% and is virtually identical in real world performance to the Radius Rocket. In some cases, LogiCache beats the Rocket by over 150%! At a retail price of only $1199 with 50MHz FPU, you can't get a better deal. LogiCache also supports twelve different Macs– the II, IIx, IIcx, IIci, IIsi, IIvx/vi, SE/30, LC, LC II, and the new Performa 400 and 600. As with all Logica products, you'll get a 30 day money back guarantee, 5 year warranty, and toll-free tech support. For additional product information or the name of your Logica dealer, call **1 800/880-0988.** Dealer inquiries invited.

MacWorld Lab tests show that 50 MHz 68030 accelerators perform as well as 25 MHz 68040 accelerators, and often cost $1000 to $1500 less.

— June 1992 MacWorld

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Austin, TX 78758
512/836-2168
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	LogiCache	PowerCache	Rocket 25
Retail Price	$1199 w/FPU	$1599 w/FPU	$1999 (Plus memory)
Speed	50MHz, 68030	50MHz, 68030	25MHz, 68040
Cache	64K, 0 wait states	32K, 1 wait state	——
100% compatible CPUs supported	Yes	Yes	No
	PDS*	PDS*	NuBus Macs only

*Some CPUs require PDS adapters

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Table 2: Features of CPU Accelerators, continued

	Mac LC				
	Apple LC II Upgrade ↕↕½	**Applied Engineering TransWarp LC 50 MHz** ↕↕	**DayStar Universal PowerCache 33 MHz** ↕↕↕↕	**DayStar Universal PowerCache 40 MHz** ↕↕↕½	**DayStar Universal PowerCache 50 MHz** ↕↕↕½
List price	$719	$1,492 with FPU, $1,199 without FPU	$799 with FPU, $649 without FPU	$1,099 with FPU, $899 without FPU	$1,599 with FPU, $1,299 without FPU
Street price	$700	$1,400 with FPU, $1,100 without FPU	$725 with FPU, $575 without FPU	$975 with FPU, $800 without FPU	$1,450 with FPU, $1,150 without FPU
Pros	Fully compatible.		Well designed. Good price/performance ratio. Good tech support.	Well designed. Works on many Macs. Good tech support.	Well designed. Works on many Macs. Good tech support.
Cons	Provides no speed increase.				
CPU	68030	68030	68030	68030	68030
CPU clock speed	16 MHz	50 MHz	33 MHz	40 MHz	50 MHz
FPU	no	optional	optional	optional	optional
Extended video	NA	NA	NA	NA	NA
Installation method	new logic board	PDS slot	PDS slot	PDS slot	PDS slot
Platforms tested	LC	LC, LC II	SE/30, LC, LC II, II, IIcx, IIsi, IIci	SE/30, LC, LC II, II, IIcx, IIsi, IIci	SE/30, LC, LC II, II, IIcx, IIsi, IIci
Warranty, guarantee	1 year, none	1 year, 15 days	3 years, 30 days	3 years, 30 days	3 years, 30 days
Company	Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014 800-538-9696 408-996-1010	Applied Engineering P.O. Box 5100 Carrollton, TX 75011 214-241-6060	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077

	Mac LC				Mac LC II
	Extreme Systems Impact 33 MHz ↕↕↕½	**Fusion Data TokaMac LC 25 MHz** ↕↕↕½	**TechWorks LC 25 MHz** ↕↕↕	**Total Systems Enterprise 030 32 MHz** ↕↕↕½	**Applied Engineering TransWarp LC 50 MHz** ↕↕
List price	$700 with FPU, $600 without FPU	$1,695	$1,595	$1,159	$1,492 with FPU, $1,199 without FPU
Street price	$700 with FPU (direct), $600 without FPU (direct)	$1,600	$1,595 (direct)	$675	$1,400 with FPU, $1,100 without FPU
Pros	Good tech support.	Fastest LC acceleration.	Good tech support.	Good tech support.	
Cons					
CPU	68030	68040	68040	68030	68030
CPU clock speed	33 MHz	25 MHz	25 MHz	32 MHz	50 MHz
FPU	optional	yes	yes	yes	optional
Extended video	NA	NA	NA	NA	NA
Installation method	PDS slot	PDS slot	PDS slot	PDS slot	PDS slot
Platforms tested	LC, LC II	LC	LC	LC, LC II	LC, LC II
Warranty, guarantee	3 years, 30 days	3 years, 30 days	lifetime, 30 days	2 years, none	1 year, 15 days
Company	Extreme Systems 1050 Industry Dr. Tukwila, WA 98188 800-995-2334 206-575-2334	Fusion Data Systems 8920 Business Park Dr. Ste. 350 Austin, TX 78759 800-285-8313 512-338-5326	Technology Works, Inc. 4030 Braker Lane W. Ste. 350 Austin, TX 78759 800-688-7466 512-794-8533	Total Systems 1720 Willow Creek Cir. Eugene, OR 97402 800-874-2288 503-345-7395	Applied Engineering P.O. Box 5100 Carrollton, TX 75011 214-241-6060

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Table 2: Features of CPU Accelerators, continued

	Mac LC II				
	DayStar Universal PowerCache 33 MHz ★★★★	**DayStar Universal PowerCache 40 MHz** ★★★½	**DayStar Universal PowerCache 50 MHz** ★★★	**Extreme Systems Impact 33 MHz** ★★★½	**Total Systems Enterprise 030 32 MHz** ★★★½
List price	$799 with FPU, $649 without FPU	$1,099 with FPU, $899 without FPU	$1,599 with FPU, $1,299 without FPU	$698 with FPU, $599 without FPU	$1,159
Street price	$725 with FPU, $575 without FPU	$975 with FPU, $800 without FPU	$1,450 with FPU, $1,150 without FPU	$698 with FPU (direct), $599 without FPU (direct)	$675
Pros	Well designed. Works on many Macs. Good tech support.	Well designed. Works on many Macs. Good tech support.	Fastest LC II acceleration. Well designed. Good tech support.	Good tech support.	Good tech support.
Cons					
CPU	68030	68030	68030	68030	68030
CPU clock speed	33 MHz	40 MHz	50 MHz	33 MHz	32 MHz
FPU	optional	optional	optional	optional	yes
Extended video	NA	NA	NA	NA	NA
Installation method	PDS slot	PDS slot	PDS slot	PDS slot	PDS slot
Platforms tested	SE/30, LC, LC II, II, IIcx, IIsi, IIci	SE/30, LC, LC II, II, IIcx, IIsi, IIci	SE/30, LC, LC II, II, IIcx, IIsi, IIci	LC, LC II	LC, LC II
Warranty, guarantee	3 years, 30 days	3 years, 30 days	3 years, 30 days	3 years, 30 days	2 years, none
Company	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	Extreme Systems 1050 Industry Dr. Tukwila, WA 98188 800-995-2334 206-575-2334	Total Systems 1720 Willow Creek Cir. Eugene, OR 97402 800-874-2288 503-345-7395

	Mac II				
	Apple IIfx Upgrade ★★★½	**Applied Engineering TransWarp 040 33 MHz** ★★½	**DayStar Universal PowerCache 33 MHz** ★★★★	**DayStar Universal PowerCache 40 MHz** ★★★★	**DayStar Universal PowerCache 50 MHz** ★★★½
List price	$2,319	$2,639	$799 with FPU, $649 without FPU	$1,099 with FPU, $899 without FPU	$1,599 with FPU, $1,299 without FPU
Street price	$2,300	$2,425	$725 with FPU, $575 without FPU	$975 with FPU, $800 without FPU	$1,450 with FPU, $1,150 without FPU
Pros	Full compatibility.	Fast acceleration.	Well designed. Works on many Macs. Good tech support.	Well designed. Works on many Macs. Good tech support.	Well designed. Works on many Macs. Good tech support.
Cons	Expensive.	Expensive. Not fully compatible with ARA.			
CPU	68030	68040	68030	68030	68030
CPU clock speed	40 MHz	33 MHz	33 MHz	40 MHz	50 MHz
FPU	yes	yes	optional	optional	optional
Extended video	NA	no	no	no	no
Installation method	logic-board replacement	NuBus slot	CPU socket	CPU socket	CPU socket
Platforms tested	II	II, IIcx, IIsi, IIci, IIfx	SE/30, LC, LC II, II, IIcx, IIsi, IIci	SE/30, LC, LC II, II, IIcx, IIsi, IIci	SE/30, LC, LC II, II, IIcx, IIsi, IIci
Warranty, guarantee	1 year, none	1 year, 15 days	3 years, 30 days	3 years, 30 days	3 years, 30 days
Company	Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014 800-538-9696 408-996-1010	Applied Engineering P.O. Box 5100 Carrollton, TX 75011 214-241-6060	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077

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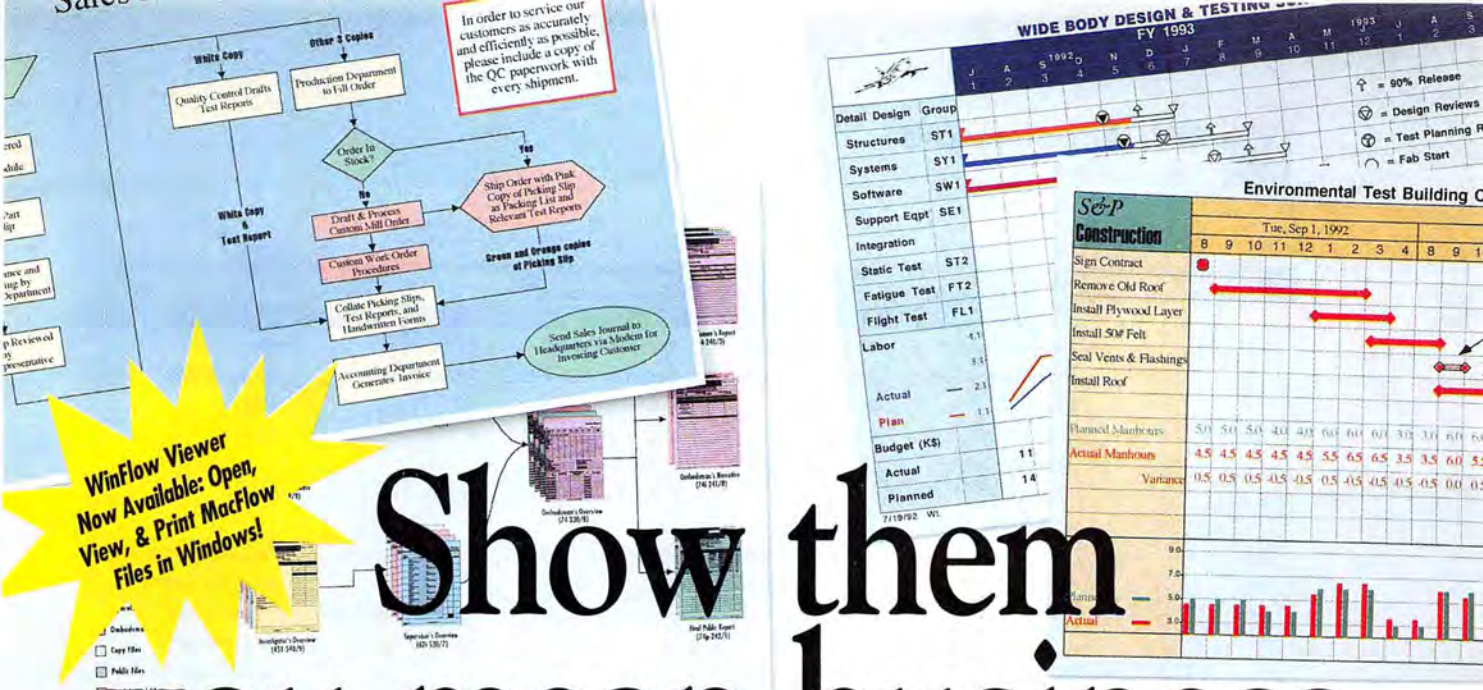
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*Mac LC, Mac II or Quadra cable adapters available at no charge from your dealer.

Table 2: Features of CPU Accelerators, continued

	Mac II				
	Dove Marathon 030 Enhancement 32 MHz ‡‡	**Dove Marathon Racer 030 II 32 MHz** ‡‡	**Radius Rocket 25 MHz** ‡‡‡½	**Radius Rocket 33 MHz** ‡‡‡‡	**TechWorks NuBus 040 33 MHz** ‡‡‡½
List price	$399	$898 with FPU, $599 without FPU	$1,999	$2,499	$1,895
Street price	$399	$875 with FPU, $500 without FPU	$1,800	$2,225	$1,875
Pros			Good tech support.	The fastest II accelerator. Good price/performance ratio. Good tech support.	Fast. Good tech support.
Cons	Unresponsive tech support.	Unresponsive tech support.	Not fully compatible with Sound Manager.	Expensive. Not fully compatible with Sound Manager.	Expensive. Not fully compatible with ARA.
CPU	68030	68030	68040	68040	68040
CPU clock speed	32 MHz	32 MHz	25 MHz	33 MHz	33 MHz
FPU	no	yes	yes	yes	yes
Extended video	no	no	no	no	no
Installation method	CPU socket	CPU socket	NuBus slot	NuBus slot	NuBus slot
Platforms tested	II	II	II, IIcx, IIci	II, IIcx, IIci	II, IIcx, IIsi, IIci
Warranty, guarantee	1 year, none	1 year, none	1 year, none	1 year, none	lifetime, 30 days
Company	Dove Computer Corp. 1200 N. 23rd St. Wilmington, NC 28405 800-849-3297 919-343-5600	Dove Computer Corp. 1200 N. 23rd St. Wilmington, NC 28405 800-849-3297 919-343-5600	Radius, Inc. 1710 Fortune Dr. San Jose, CA 95131 800-227-2795 408-954-1010	Radius, Inc. 1710 Fortune Dr. San Jose, CA 95131 800-227-2795 408-954-1010	Technology Works, Inc. 4030 Braker Ln. W. Ste. 350 Austin, TX 78759 800-688-7466 512-794-8533

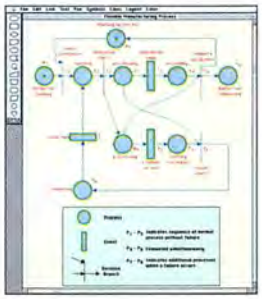
	Mac II	Mac IIcx			
	Total Systems Voyager 50 MHz ‡‡‡	**Apple IIci Upgrade** ‡‡‡½	**Apple Quadra 700 Upgrade** ‡‡‡½	**Applied Engineering TransWarp 040 25 MHz** ‡‡½	**Applied Engineering TransWarp 040 33 MHz** ‡‡½
List price	$2,519 with FPU, $2,219 without FPU	$1,339	$3,129	$1,979	$2,639
Street price	$1,500 with FPU, $1,400 without FPU	$1,300	$3,100	$1,825	$2,425
Pros	Good tech support.		Full compatibility. 24-bit-video support. Built-in Ethernet. Microphone.		Fast.
Cons			Expensive.	Not fully compatible with ARA.	Not fully compatible with ARA.
CPU	68030	68030	68040	68040	68040
CPU clock speed	50 MHz	25 MHz	25 MHz	25 MHz	33 MHz
FPU	optional	yes	no	yes	yes
Extended video	no	NA	NA	NA	NA
Installation method	CPU socket	logic-board replacement	factory-/dealer-installed	NuBus slot	NuBus slot
Platforms tested	II	IIcx	IIcx, IIci	IIcx, IIsi, IIci, IIfx	II, IIcx, IIsi, IIci, IIfx
Warranty, guarantee	2 years, none	1 year, none	1 year, none	1 year, 15 days	1 year, 15 days
Company	Total Systems 1720 Willow Creek Cir. Eugene, OR 97402 800-874-2288 503-345-7395	Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014 800-538-9696 408-996-1010	Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014 800-538-9696 408-996-1010	Applied Engineering P.O. Box 5100 Carrollton, TX 75011 214-241-6060	Applied Engineering P.O. Box 5100 Carrollton, TX 75011 214-241-6060



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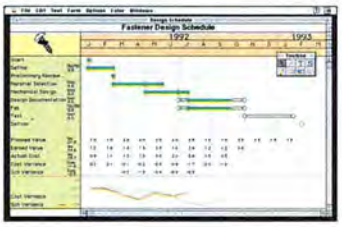
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Table 2: Features of CPU Accelerators, continued

	Mac IIcx				
	DayStar Universal PowerCache 33 MHz ‡‡‡‡	**DayStar Universal PowerCache 40 MHz** ‡‡‡½	**DayStar Universal PowerCache 50 MHz** ‡‡‡	**Radius Rocket 25 MHz** ‡‡‡½	**Radius Rocket 33 MHz** ‡‡‡‡
List price	$799 with FPU, $649 without FPU	$1,099 with FPU, $899 without FPU	$1,599 with FPU, $1,299 without FPU	$1,999	$2,499
Street price	$725 with FPU, $575 without FPU	$975 with FPU, $800 without FPU	$1,450 with FPU, $1,150 without FPU	$1,800	$2,225
Pros	Works on many Macs. Good tech support.	Works on many Macs. Good tech support.	Works on many Macs. Good tech support.	Good tech support.	Fastest IIcx acceleration. Good tech support.
Cons				Not fully compatible with Sound Manager.	Expensive. Not fully compatible with Sound Manager.
CPU	68030	68030	68030	68040	68040
CPU clock speed	33 MHz	40 MHz	50 MHz	25 MHz	33 MHz
FPU	optional	optional	optional	yes	yes
Extended video	NA	NA	NA	NA	NA
Installation method	CPU socket	CPU socket	CPU socket	NuBus slot	NuBus slot
Platforms tested	SE/30, LC, LC II, II, IIcx, IIsi, IIci	SE/30, LC, LC II, II, IIcx, IIsi, IIci	SE/30, LC, LC II, II, IIcx, IIsi, IIci	II, IIcx, IIci	II, IIcx, IIci
Warranty, guarantee	3 years, 30 days	3 years, 30 days	3 years, 30 days	one year, none	one year, none
Company	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	Radius, Inc. 1710 Fortune Dr. San Jose, CA 95131 800-227-2795 408-954-1010	Radius, Inc. 1710 Fortune Dr. San Jose, CA 95131 800-227-2795 408-954-1010

	Mac IIcx	Mac IIsi			
	TechWorks NuBus 040 33 MHz ‡‡‡½	**Applied Engineering TransWarp 040 25 MHz** ‡‡½	**Applied Engineering TransWarp 040 33 MHz** ‡‡½	**DayStar Universal PowerCache 33 MHz** ‡‡‡‡	**DayStar Universal PowerCache 40 MHz** ‡‡‡½
List price	$1,895	$1,979	$2,639	$799 with FPU, $649 without FPU	$1,099 with FPU, $899 without FPU
Street price	$1,875	$1,825	$2,425	$725 with FPU, $575 without FPU	$975 with FPU, $800 without FPU
Pros	Fast acceleration. Good tech support.	Fast.		Well designed. Good tech support.	Well designed. Good tech support.
Cons	Not fully compatible with ARA.	Not fully compatible with ARA.	Expensive. Not fully compatible with ARA.		
CPU	68040	68040	68040	68030	68030
CPU clock speed	33 MHz	25 MHz	33 MHz	33 MHz	40 MHz
FPU	yes	yes	yes	optional	optional
Extended video	NA	NA	NA	NA	NA
Installation method	NuBus slot	PDS slot	PDS slot	PDS slot	PDS slot
Platforms tested	II, IIcx, IIsi, IIci	IIcx, IIsi, IIci, IIfx	II, IIcx, IIsi, IIci, IIfx	SE/30, LC, LC II, II, IIcx, IIsi, IIci	SE/30, LC, LC II, II, IIcx, IIsi, IIci
Warranty, guarantee	lifetime, 30 days	1 year, 15 days	1 year, 15 days	3 years, 30 days	3 years, 30 days
Company	Technology Works, Inc. 4030 Braker Lane W. Ste. 350 Austin, TX 78759 800-688-7466 512-794-8533	Applied Engineering P.O. Box 5100 Carrollton, TX 75011 214-241-6060	Applied Engineering P.O. Box 5100 Carrollton, TX 75011 214-241-6060	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077

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Table 2: Features of CPU Accelerators, continued

	Mac IIsi				
	DayStar Universal PowerCache 50 MHz ★★★	**Fusion Data TokaMac SX 25 MHz** ★★★	**Logica LogiCache 50 MHz** ★★★★½	**TechWorks NuBus 040 33 MHz** ★★★½	**Total Systems Magellan 040 25 MHz** ★★★½
List price	$1,599 with FPU, $1,299 without FPU	$1,695	$1,199 with FPU, $1,039 without FPU	$1,895	$2,999
Street price	$1,450 with FPU, $1,150 without FPU	$1,600	$1,050 with FPU, $925 without FPU	$1,875	$1,500
Pros	Well designed. Works on many Macs. Good tech support.		Best price/performance ratio. PDS pass-through slot included.	Fastest IIsi acceleration. Good tech support.	Good tech support.
Cons				Not fully compatible with ARA.	
CPU	68030	68040	68030	68040	68040
CPU clock speed	50 MHz	25 MHz	50 MHz	33 MHz	25 MHz
FPU	optional	yes	optional	yes	yes
Extended video	NA	NA	NA	NA	NA
Installation method	PDS slot	PDS slot	PDS slot	PDS slot	PDS slot
Platforms tested	SE/30, LC, LC II, II, IIcx, IIsi, IIci	IIsi	IIsi, IIci	II, IIcx, IIsi, IIci	SE/30, IIsi, IIci
Warranty, guarantee	3 years, 30 days	1 year, 30 days	5 years, 30 days	lifetime, 30 days	2 years, none
Company	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	Fusion Data Systems 8920 Business Park Dr. Ste. 350 Austin, TX 78759 800-285-8313 512-338-5326	Logica Research, Inc. 8760 Research Blvd. Austin, TX 78758 800-880-0988 512-836-2168	Technology Works, Inc. 4030 Braker Lane W. Ste. 350 Austin, TX 78759 800-688-7466 512-794-8533	Total Systems 1720 Willow Creek Cir. Eugene, OR 97402 800-874-2288 503-345-7395
	Mac IIci				
	Applied Engineering TransWarp 040 25 MHz ★★½	**Applied Engineering TransWarp 040 33 MHz** ★★½	**Applied Engineering TransWarp CI 50 MHz** ★★½	**DayStar Universal PowerCache 33 MHz** ★★★½	**DayStar Universal PowerCache 40 MHz** ★★★
List price	$1,979	$2,639	$1,559 with FPU, $1,265 without FPU	$799 with FPU, $649 without FPU	$1,099 with FPU, $899 without FPU
Street price	$1,825	$2,425	$1,425 with FPU, $1,150 without FPU	$725 with FPU, $575 without FPU	$975 with FPU, $800 without FPU
Pros				Well designed. Works on many Macs. Good tech support.	Well designed. Works on many Macs. Good tech support.
Cons	Not fully compatible with ARA.	Expensive. Not fully compatible with ARA.			
CPU	68040	68040	68030	68030	68030
CPU clock speed	25 MHz	33 MHz	50 MHz	33 MHz	40 MHz
FPU	yes	yes	optional	optional	optional
Extended video	NA	NA	NA	NA	NA
Installation method	NuBus slot	NuBus slot	cache-card slot	cache-card slot	cache-card slot
Platforms tested	IIcx, IIsi, IIci, IIfx	II, IIcx, IIsi, IIci, IIfx	IIci	SE/30, LC, LC II, II, IIcx, IIsi, IIci	SE/30, LC, LC II, II, IIcx, IIsi, IIci
Warranty, guarantee	1 year, 15 days	1 year, 15 days	1 year, 15 days	3 years, 30 days	3 years, 30 days
Company	Applied Engineering P.O. Box 5100 Carrollton, TX 75011 214-241-6060	Applied Engineering P.O. Box 5100 Carrollton, TX 75011 214-241-6060	Applied Engineering P.O. Box 5100 Carrollton, TX 75011 214-241-6060	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077

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CIRCLE 126 ON READER SERVICE CARD.

Table 2: Features of CPU Accelerators, continued

	Mac IIci				
	DayStar Universal PowerCache 50 MHz ★★★	**Fusion Data TokaMac CI 25 MHz** ★★★½	**Logica LogiCache 50 MHz** ★★★★½	**Radius Rocket 25 MHz** ★★★½	**Radius Rocket 33 MHz** ★★★★
List price	$1,599 with FPU, $1,299 without FPU	$1,695	$1,199 with FPU, $1,039 without FPU	$1,999	$2,499
Street price	$1,450 with FPU, $1,150 without FPU	$1,600	$1,050 with FPU, $925 without FPU	$1,800	$2,225
Pros	Well designed. Works on many Macs. Good tech support.	Good price/performance ratio.	Good price/performance ratio. Good tech support.	Good tech support.	Fastest IIci acceleration. Good tech support.
Cons				Not fully compatible with Sound Manager.	Expensive. Not fully compatible with Sound Manager.
CPU	68030	68040	68030	68040	68040
CPU clock speed	50 MHz	25 MHz	50 MHz	25 MHz	33 MHz
FPU	optional	yes	optional	yes	yes
Extended video	NA	NA	NA	NA	NA
Installation method	cache-card slot	cache-card slot	cache-card slot	NuBus slot	NuBus slot
Platforms tested	SE/30, LC, LC II, II, IIcx, IIsi, IIci	IIci	IIsi, IIci	II, IIcx, IIci	II, IIcx, IIci
Warranty, guarantee	3 years, 30 days	1 year, 30 days	5 years, 30 days	1 year, none	1 year, none
Company	DayStar Digital, Inc. 5556 Atlanta Hwy. Flowery Branch, GA 30542 800-962-2077 404-967-2077	Fusion Data Systems 8920 Business Park Dr. Ste. 350 Austin, TX 78759 800-285-8313 512-338-5326	Logica Research, Inc. 8760 Research Blvd. Austin, TX 78758 800-880-0988 512-836-2168	Radius, Inc. 1710 Fortune Dr. San Jose, CA 95131 800-227-2795 408-954-1010	Radius, Inc. 1710 Fortune Dr. San Jose, CA 95131 800-227-2795 408-954-1010

	Mac IIci		Mac IIfx		
	TechWorks NuBus 040 33 MHz ★★★½	**Total Systems Magellan 040 25 MHz** ★★★★½	**Applied Engineering TransWarp 040 25 MHz** ★★½	**Applied Engineering TransWarp 040 33 MHz** ★★½	**Fusion Data TokaMac FX 33 MHz** ★★★★
List price	$1,895	$2,999	$1,979	$2,639	$3,195
Street price	$1,875	$1,500	$1,825	$2,425	$2,900
Pros	Fast acceleration. Good tech support.	Good tech support.		Fast acceleration.	Fastest IIfx acceleration.
Cons	Not fully compatible with ARA.	Expensive.	Not fully compatible with ARA.	Not fully compatible with ARA.	Expensive.
CPU	68040	68040	68040	68040	68040
CPU clock speed	33 MHz	25 MHz	25 MHz	33 MHz	33 MHz
FPU	yes	yes	yes	yes	yes
Extended video	NA	NA	NA	NA	NA
Installation method	NuBus slot	cache-card slot	NuBus slot	NuBus slot	NuBus slot
Platforms tested	II, IIcx, IIsi, IIci	SE/30, IIsi, IIci	IIcx, IIsi, IIci, IIfx	II, IIcx, IIsi, IIci, IIfx	IIfx
Warranty, guarantee	lifetime, 30 days	2 years, none	1 year, 15 days	1 year, 15 days	1 year, 30 days
Company	Technology Works, Inc. 4030 Braker Lane W. Ste. 350 Austin, TX 78759 800-688-7466 512-794-8533	Total Systems 1720 Willow Creek Cir. Eugene, OR 97402 800-874-2288 503-345-7395	Applied Engineering P.O. Box 5100 Carrollton, TX 75011 214-241-6060	Applied Engineering P.O. Box 5100 Carrollton, TX 75011 214-241-6060	Fusion Data Systems 8920 Business Park Dr. Ste. 350 Austin, TX 78759 800-285-8313 512-338-5326

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Manufacturer	Microtech	MicroNet	Ricoh	PLI
External Model	Genesis 650	SB SMO-1	RS9200EX	MaxOptical
Internal Model	Genesis 650i	none	none	none
Capacity	650MB	650MB	650MB	650MB/1GB
Access Time	40ms	95ms	37ms	35ms
Mechanism	Sharp	Sony	Ricoh	Maxoptix
Warranty	2 year	1 year	1 year	1 year
List Price	$2199	$3995	$3900	$4599

Specifications and pricing based on respective manufacturer's quotation 11/24/92.

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CIRCLE 160 ON READER SERVICE CARD.

Breaking the Bottlenecks

You've just upgraded to a blazingly fast CPU. So why is it taking so long for that screen to redraw, for that window to scroll, for that document to print? If you're searching for even more speed, here are some other upgrades you should consider for optimum performance.

BY SHARON ZARDETTO AKER

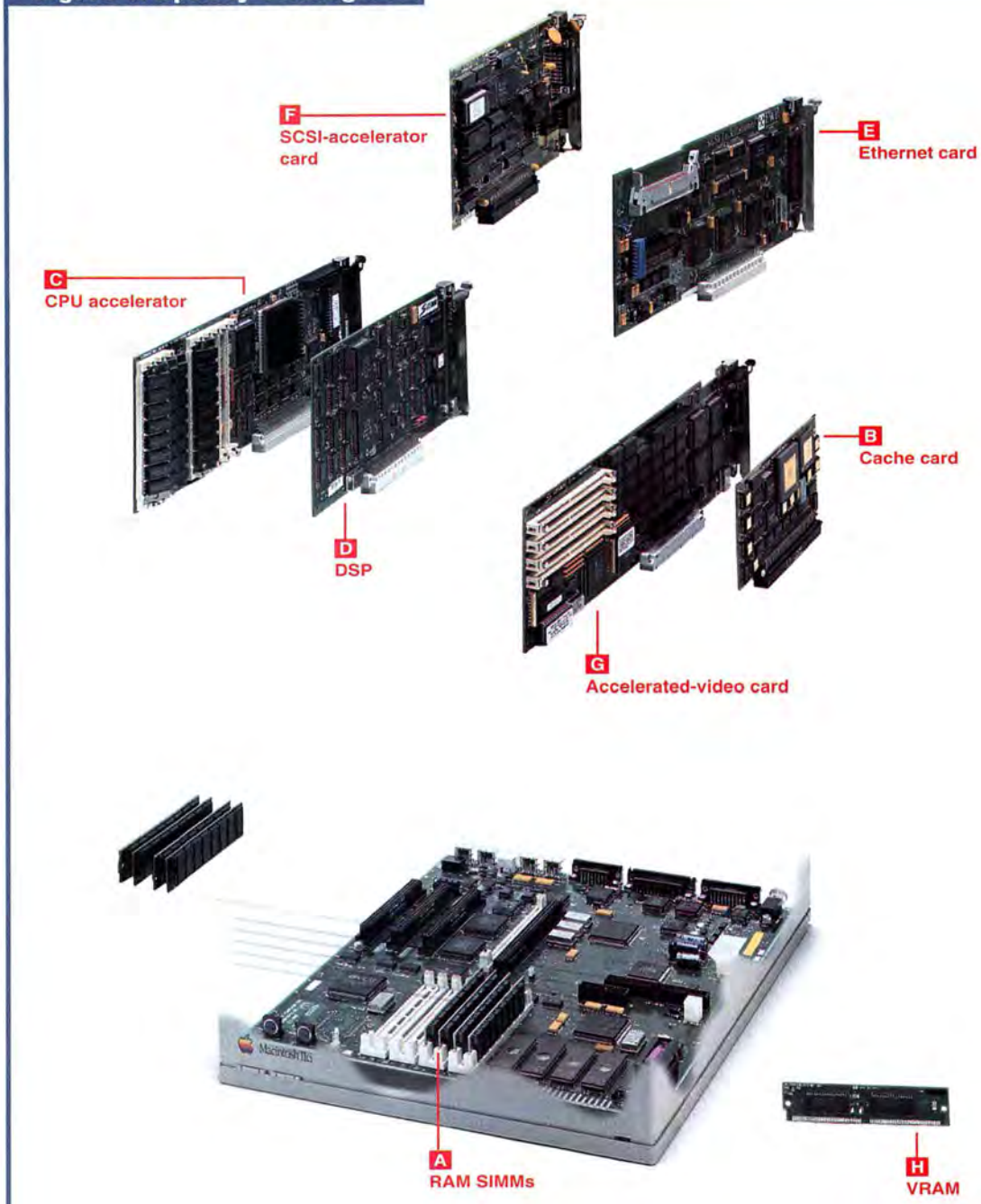
Speeding up your Mac isn't simply a matter of installing a CPU accelerator. It'll certainly help, but it won't speed up tasks that are outside the CPU's control — data transfer, scrolling through documents, or printing, for example. And if these are areas in which your Mac is slowing you down, getting a CPU accelerator alone is going to leave you disappointed. You need a balanced hardware setup if you really want to see an increase in speed, and just to make things more confusing, something that speeds up some operations won't have any effect at all on other procedures.

Your first task should be to analyze what your Mac's performance bottlenecks are (see Figure 1). Once you know which areas you want to upgrade, read on for a quick guide to your options.

PHOTOGRAPHY: WALT DENSON


Adobe
Photoshop
Quicker
DRAW

Figure 1: Speedy Strategies



Max Out Your *Memory*

The first thing you can do to speed up your system's overall operation is not only the simplest but it's also fairly inexpensive: Add more RAM (random-access memory). Everything works faster if it's stored in RAM instead of on your hard disk or another storage medium. The main drawback is that RAM is volatile — that is, you will lose the data stored there if you do not save it to your hard disk before turning off your computer.

How much RAM is enough? Generally speaking, whatever you have, it's not enough. Under System 7, the

Figure 1: If you analyze how you work, you'll be able to identify the areas in which your Mac's performance is below par. Use this diagram to see if you can boost your Mac's performance, either by adding hardware or just by working smarter. We've used a IIci to show as wide a variety of speed enhancements as possible. Of course, you probably wouldn't add all these cards (in fact you couldn't, because the IIci has only three NuBus slots), but you can get some idea of what you can achieve, short of buying a new, faster Mac.

1. Memory. Make the most of your Mac's memory. First install as much RAM (**A**) as you can, and then make use of other memory boosters such as RAM caches (**B**) and RAM disks.

2. Printer. If printing is slowing you down, get a faster printer (a laser printer instead of an inkjet printer, for example). If you have a LaserWriter, you may be able to upgrade it or add memory. Adding a hard drive to your laser printer can speed up printing too. If you're still using System 6, get a copy of PrintMonitor or another print spooler so your Mac can print in the background.

3. CPU. Adding a CPU accelerator (**C**) makes most operations on your Mac speed up. If you're still frustrated by your Mac's sluggish performance, even after addressing all the bottlenecks, it's probably time to consider buying a faster and more powerful Mac.

4. Applications. Some upgrades specifically target how quickly you can use certain applications. An FPU (floating-point unit), for example, can speed up spreadsheet programs or any application that performs complex mathematical calculations. (FPUs are often included with CPU accelerators.) A DSP (digital signal processor) (**D**) can accelerate specific Photoshop filters to pretty astounding speeds.

5. Network. If you have access to Ethernet, make sure you're able to use it by having an Ethernet card (**E**) installed.

6. External SCSI devices. Be aware of the differences in speed among the different storage media: An erasable optical drive has so-so performance, a 3.5-inch hard drive is fast, a disk array is very fast, and a solid-state drive is extremely fast. If your hard drive is faster than your Mac's built-in SCSI bus, consider adding a SCSI-accelerator card (**F**), which will give you a faster data path to let you take advantage of your fast hard drive's data-transfer rate.

7. System software. System 7 has many good features, but speed isn't one of them. You can strip down System 7 by pulling unused fonts and sounds out of the System file and by removing extensions, such as Easy Access and DAL, if you know you won't ever use them. If you don't need System 7's special features, you can reinstall System 6, which is leaner and faster.

8. Monitor. Small monitors are faster than large ones; working in monochrome is faster than working in color. Adding an accelerated-video card (**G**) can speed up certain QuickDraw operations (scrolling, for example). Installing VRAM (video RAM) (**H**) doesn't speed up screen redraw, but it does let you use more colors and a bigger monitor.

9. Internal hard drive. Replace a slow drive with a faster model. If your drive is faster than your Mac's built-in SCSI bus, consider adding a SCSI-accelerator card (**F**).

10. Modem. Replace a slow modem with the fastest modem you can buy, and your telecom sessions will fly. If you will be sending faxes from your Mac, make sure that your modem has fast fax-send/receive rates as well as fast data-transfer rates.



minimum workable amount is 4 megabytes, sufficient for running one program at a time for word processing, number crunching, or uncomplicated graphics and layout. You'll need 8 megabytes if you want to do the same work but run more than one program at a time or if you do moderately complex graphics and desktop publishing with only one program at a time. Doing complicated color graphics and video? Get as much RAM as your machine can hold (to find out how much, see Table 1 in "Maximum RAM," January '93, page 102). The best place to buy RAM is through mail order; direct from the manufacturer; or from a memory dealer such as The Chip Merchant or Technology Works. Look for vendors in the back pages of *MacUser* and other Mac magazines.

(Note that although the SIMMs you buy for upgrading your Mac's memory are rated according to their speed, faster chips don't necessarily mean a faster system. A Mac can access its main RAM at only a set speed, and installing chips faster than what the Mac can use won't garner any extra nanoseconds.)

There are three simple ways in which you can make the most of your Mac's RAM — beef up an application's partition or use a disk cache or RAM disk. The more memory you have, the more you can allocate to each approach.

An Application Partition. The larger the portion of an application that can stay in RAM, the fewer time-consuming trips the CPU needs to make to the hard disk to get segments of the program that weren't initially loaded into RAM. And with memory to spare in its allocation space, a program can keep more of its documents in memory, again avoiding frequent disk accesses for swapping information between the disk and RAM. You'll find the application partition in the application's Get Info box (press Command-I); just type a larger amount into the box labeled Current Size.

A Disk Cache. A disk cache stores data recently accessed from your hard disk in RAM so that the CPU can access it more quickly. (A RAM cache is something different, even though, confusingly, a disk cache was called a RAM cache under System 6.) Retrieving data from a disk cache is hundreds of times faster than getting it from a hard disk. Under System 7, you set the size of your disk cache in the Memory control panel, but unlike with System 6, you cannot turn off the disk cache (the lowest setting is 32K). If you have a lot of memory, you can afford a large cache. The rule of thumb is 32K for each megabyte of installed RAM, but don't go above 1 megabyte.

A RAM Disk. Hardware and software options are available that let part of your RAM masquerade as a disk (you can even see its icon on the desktop). A RAM disk lets you keep an application or even your System Folder in RAM so that operations will be superspeedy. If you turn your Mac off, however, the RAM disk (and all the applications and data it contains) will be lost. If you have a PowerBook or a Quadra, you can assign RAM to a RAM disk through the Memory control panel. For those who don't have that option, commercial products (such as Connectix's Maxima) and shareware utilities are available that let you create a RAM disk. Check on-line services such as America Online or CompuServe as well as user groups for shareware products.

With a hardware RAM disk, the RAM isn't taken from main memory but instead comes from the RAM on a separate card (usually a NuBus card) or from an external device that is connected to your Mac via the SCSI port. Running your system or your applications from such a RAM disk can make your work sessions really fly. Because the RAM on a RAM disk is as volatile as regular RAM, you wouldn't want to keep any documents on it (although you can use it to store such files as Photoshop's virtual scratch file). If, however, you crash and have to *reset* your computer (using the button containing the triangle icon), the information in this separate RAM disk will still be there, because resetting your Mac doesn't interrupt the power supply and resets only the main RAM. If you want to be really tricky, you can use a RAM disk to increase main memory: Use virtual memory, specifying the RAM disk as the place for the virtual-memory files. Two vendors that sell RAM disks are ATTO Technologies and DayStar Digital.

The Cache Advantage

A more elaborate way to max out your RAM is to use a *RAM cache*, or *cache memory*. At press time, this option is built in to the IIvx and the Quadras, the IIci has a special cache slot, and you can add a cache card to the IIsi's expansion slot. A RAM cache works similarly to a

Make the Upgrade

Whether you have a Classic or a Quadra 950, there's always a way to upgrade your Mac. From adding RAM to using accelerator boards to increasing storage capacity, you have different options to boost the performance of your Mac. Many articles in *MacUser* have focused on getting the best performance from your computer and saving money in the process. They include detailed lab reports, in-depth features, and articles containing plenty of hands-on tips. They are listed here in reverse chronological order.

"Upgrading the Mac LC," March '93, page 239 — From choosing an accelerator to putting a new case on your Mac LC, this quick guide shows you the best options for updating Apple's most popular desktop Mac.

"Maximum RAM," January '93, page 90 — Any questions you have about installing more RAM in your Mac are answered in this memory guide. Included are step-by-step instructions for installing memory yourself and a table showing the various memory configurations available for the Mac family.

"Upgrading the Mac SE/30," January '93, page 253 — Your Mac SE/30 can still keep up the pace if you follow the suggestions listed here.

"Upgrading the Mac IIci," December '92, page 261 — Several upgrade paths are discussed for the Mac IIci.

"Fast 68040 Accelerators," November '92, page 210 — MacUser Labs tests five accelerators for the Mac II and two cache cards, one for the Quadra 700 and 900 and one for all Quadras.

"Upgrading the Mac SE," November '92, page 275 — You don't have to retire your Mac SE yet. This article provides tips on getting the best performance from this workhorse Mac.

"Upgrade Mobility," October '92, page 29 — *MacUser*'s Consumer Crusader Andy Ihnatko describes ways to evaluate upgrades to help you get the most for your money.

"Repairs and Upgrades for the Mac IIfx," October '92,

disk cache, except that it uses its own static RAM, which is much faster than the dynamic RAM used for main memory (and, therefore, disk caches). Your Mac's limitation on RAM speed applies to the dynamic RAM on the motherboard, but there's a separate, much higher speed limit for the speed of the memory in a cache. A cache card can boost your system's performance 10 to 55 percent, depending on what machine you're using and what operations you're performing.

If you have a IIci that shipped in late 1991, you'll find that Apple filled the cache slot with a 32K cache card. Don't worry if you're missing the cache card; you can get one from Apple or from third-party vendors: The Cache-In (Applied Engineering) and the FastCache IIci (DayStar Digital) each offer 32K of cache RAM. Testing by MacUser Labs has shown that there is no advantage to be gained from using caches larger than 32K (see "High-Speed, Low-Cost IIci Cache Cards," June '91, page 124), although you can go for a 64K model, such as the IIci Cache Card (Technology Works), the Cache ci (ATTO), or the FastCache IIci (DayStar Digital). The QuickCache IIci (Total Systems) and the Xceed IIci (Xceed Technology) each offer a 128K configuration.

The IIci isn't the only Mac that can benefit from a RAM cache. If you have a IIsi, check out the FastCache IIsi (DayStar Digital). And if a Quadra's native speed isn't enough for you, consider DayStar's FastCache Quadra cards, which can boost performance by 10 percent or more, depending on what you're doing.

page 275 — Here's how to make your IIfx run just like a Quadra.

"New Life for Old Macs," September '92, page 132 — Upgrade paths for the Mac Plus, II, and Portable — representing compact, modular, and portable Macs, respectively — are discussed and evaluated based on ease, cost, and end result.

"Supercharging the SCSI Bus: SCSI-2 Cards," July '92, Buyer's Guide page 42 — A comparison of four speedy SCSI-2 cards that can boost your Mac's data-transfer capabilities.

"Blasting Off: CPU Accelerators," June '92, page 166 — Twelve CPU accelerators guaranteed to give your Mac a big boost are put through their paces by MacUser Labs.

"Chasing Rainbows: Accelerated-Video Cards," May '92, Buyer's Guide page 16 — This lab report tests eight video accelerators that are designed to help you improve display performance.

"Memory 101," April '92, page 209 — Bob LeVitus provides a thorough review of everything you need to know about managing your Mac's memory. He discusses what a disk cache does, the benefits of virtual memory, and more.

"How to Buy Memory," February '92, page 259 — A checklist of fundamentals you should know about if you're in the market for more memory.

"High-Speed, Low-Cost IIci Cache Cards," June '91, page 124 — Eight inexpensive cache cards for the IIci are put through their paces by MacUser Labs. The report also includes a discussion of card installation.

"SIMMple Pleasures," April '91, page 194 — This article includes everything you need to know about upgrading and buying memory.

"Chasing the IIfx: Accelerators," August '90, page 84 — MacUser Labs tests and rates 30 accelerators designed to make any Mac fast.

— Amanda B. Michael

Quicker DRAW

The biggest disappointment for many users who've upgraded their CPUs is that the upgrade has little or no effect on how fast things scroll or zoom on-screen. A CPU accelerator speeds up Photoshop filters and Illustrator previews some, but screen-redraw rates are still glacial, to say the least, especially if you use a large monitor, work in 24-bit color, or do both. The solution? Try a QuickDraw accelerator, also called an accelerated-video card.

Much of what you see on your monitor is created from QuickDraw routines in the Mac's ROM (read-only memory), and the Mac's CPU is used to handle all the "calls" to QuickDraw. While the CPU is busy drawing the screen, it can't do anything else — respond to a mouse click or a keyboard command, for example — so your entire system slows down. QuickDraw accelerators are special-purpose NuBus cards, often with video circuitry for driving a monitor, that speed up screen redraws by relieving the CPU from QuickDraw computing. An extension watches for certain calls, intercepts them, and hands them over to the QuickDraw accelerator for faster handling.

With the exception of Apple's 8•24 GC card (which is no longer being manufactured), QuickDraw cards can't speed up all QuickDraw routines. Third-party vendors have had to rebuild QuickDraw's proprietary code and the most commonly used routines from scratch for their cards. Even so, any QuickDraw accelerator can speed up basic tasks such as scrolling and several speed up these tasks significantly.

Shopping for a QuickDraw accelerator involves a labyrinth of considerations and compatibility issues. The choices can be confusing: Some video cards include graphics acceleration; others have a slot for a later accelerator upgrade. If you choose to buy a *separate* accelerator card, which may be hard to find, bear in mind that many QuickDraw accelerators don't work with older video cards that don't accommodate the QuickDraw accelerator's block-transfer mode, which takes advantage of the NuBus' top speed.

Unfortunately, QuickDraw acceleration by itself doesn't speed up your screen operations and many popular programs depend heavily on QuickDraw routines that are not included in the acceleration. So you'll find

that desktop windows open and shut with fascinating speed, your word processor scrolls too quickly, and PageMaker windows redraw in the blink of an eye; on the other hand, much of Illustrator and all of Photoshop will be as slow as ever.

Accelerated-video cards are available for many Mac models from many companies. Some of these vendors — E-Machines, Radius, RasterOps, and SuperMac, for example — have been around almost as long as the Mac itself has.

Faster Photoshop

You've souped up your CPU, revved up your RAM, and quickened your QuickDraw, and guess what? Photoshop still isn't moving at a reasonable working speed. That's because it's still taxing your CPU to the limit, its files are humongous, and it's not using QuickDraw. But the situation's not hopeless.

An *application-specific accelerator* is a dedicated accelerator card that contains a RISC (reduced-instruction-set computing) processor or a DSP (digital signal processor). These processors are able to compute specific instructions at speeds that put your Mac's processor to shame. What instructions? The ones you need for specific Photoshop filters, for example. Along with the card, you get software that re-creates popular Photoshop filters so they can be computed by the processor on the accelerator card instead of by the Mac's CPU. Some of the reported speed increases are fairly spectacular — we've heard of 500-to-*2,000*-percent increases, depending on your Mac.

Manufacturers of application-specific accelerators face the same problems as do those that make QuickDraw accelerators: They're trying to speed up complicated, *proprietary* segments of code. That's why Photoshop accelerators, like their QuickDraw counterparts, concentrate on only a few often-used routines. The good news is that Adobe, Photoshop's creator, has announced that version 2.5 of the program will have an open architecture. This means no more secrets, so card manufacturers will be able to speed up not just filters but other operations as well.

Current Photoshop accelerators include the Charger

Directory

Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014
800-776-2333
408-996-1010
Macintosh IIci Cache Card, $399

Applied Engineering
3210 Beltline Road
Dallas, TX 75234
214-241-6060
Cache-In, $219

ATTO Technology, Inc.
Baird Research Park
1576 Sweet Home Road
Amherst, NY 14228
716-688-4259
Cache ci, $295
SiliconExpress II, $995

Connectix
2655 Campus Drive
San Mateo, CA 94403
800-950-5880
415-571-5100
Maxima, $69

DayStar Digital, Inc.
5556 Atlanta Highway
Flowery Branch, GA 30542
800-962-2077
404-967-2077
Charger, $949
Charger Pro, $1,599
DataStream, $799 to $1,499
FastCache, $189 to $449

DynaTek Automation Systems, Inc.
15 Tangiers Road
Toronto, ON M3J 2B1
Canada
416-636-3000
XRAID, $32,950 and up

E-Machines
93505 S.W. Gemini Drive
Beaverton, OR 97005
800-344-7274
503-646-6699

FWB, Inc.
2040 Polk Street
Suite 215
San Francisco, CA 94109
415-563-8381
JackHammer, $999 ($799 when purchased with a drive)
SledgeHammer 240, $1,329
SledgeHammer 480, $2,529
SledgeHammer 4000FMF, $11,309

Loviél Computer Corp.
5599 W. 78th Street
Edina, MN 55439
612-828-6880
Arrow, $949
R1 Disk Array, $12,000 and up

MicroNet Technology
20 Mason
Irvine, CA 92718
714-837-6033
NuPort III, $300 (not sold alone)
Raven•040 Q9i/i-1030R, $4,490
Raven•040 Q9e/e-2600R, $10,590
Raven•040 Q9e/e-5560R, $18,590

Newer Technology
7803 E. Osie Street
Suite 105
Wichita, KS 67207
800-678-3726
316-685-4904
Image Magic, $895 (IIfx and Quadra PDS)
Image Magic, $995 (NuBus)

(DayStar Digital), Image Magic (Newer Technology), Lightning Effects (Spectral Innovations), DSP Booster (Radius), PhotoPro (RasterOps), and ThunderStorm (SuperMac). You probably won't need to upgrade these cards when Adobe releases Photoshop-architecture information, because it's the software, not the hardware, that will change.

Speedier STORAGE

It wasn't that long ago that an average transfer rate of 2 megabytes per second between a Mac and a hard drive seemed sufficient. But in these days of mega and giga files, that's just too slow for transferring data and working on some documents. Hard drives are getting faster, but that's not going to improve things. The real bottleneck in Mac-to-disk operations is the SCSI interface.

The Mac's SCSI controller is set to send information at a top speed that can't be changed. (This speed varies from one model to another: 650K per second with the Classic, 1.5 megabytes per second with the IIfx, 2 megabytes per second with the IIci, 3.2 megabytes per second with the Quadra.) You can buy the fastest drive in the west, but you'll still be limited to the speed of your SCSI controller.

Luckily, the original SCSI standard has been updated to SCSI-2, which provides for greater speed (see "Supercharging the SCSI Bus: SCSI-2 Cards," July '92, Buyer's Guide page 42). Basic SCSI-2 has a top transfer rate that's the same as that of the original SCSI: 5 megabytes per second on an 8-bit-wide path. But SCSI-2's Fast mode doubles the speed of the data flow to 10 megabytes per second, and SCSI-2's Wide mode doubles the data path to 16 bits. If you use Fast and Wide together, you'll have quadrupled the original transfer rate, to 20 megabytes per second. The theoretically possible extra-wide 32-bit SCSI-2 would, in Fast mode, show an *eightfold* increase in the transfer rate, to 40 megabytes per second.

The problem is that you can't speed up your SCSI controller. There is a solution, however, in the form of a SCSI-accelerator card called a *Fast SCSI-2 host adapter,* which contains a SCSI-2 controller and, typically, two drive connectors, one for an internal drive and one for an external drive. Some accelerators use a NuBus slot;

PLI
47421 Bayside Parkway
Fremont, CA 94538
800-288-8754
510-657-2211
MiniArray, $2,600 to $5,850
QuickSCSI, $421

Radius, Inc.
1710 Fortune Drive
San Jose, CA 95131
800-227-2795
408-434-1010
DSP Booster, $899

RasterOps
2500 Walsh Avenue
Santa Clara, CA 95951
800-729-2656
408-562-4200
PhotoPro, $999

Spectral Innovations, Inc.
1885 Lundy Avenue
Suite 208
San Jose, CA 95131
408-955-0366
Lightning Effects,
$695 (Quadra and IIfx)
$795 (NuBus)

Storage Dimensions
1656 McCarthy Blvd.
Milpitas, CA 95035
408-954-0710
Data Cannon PDS/FX, $779
Data Cannon PDS/Quadra,
$999
MacinStor SpeedArray (fast),
$6,194 to $45,209
MacinStor SpeedArray (wide), $24,999 to $47,999

SuperMac Technology
485 Potrero Avenue
Sunnyvale, CA 94086
800-334-3005
408-245-2202
ThunderStorm, $999
ThunderStorm Pro, $3,699

Technology Works
4030 Braker Lane W.
Suite 350
Austin, TX 78759
800-926-3148
512-794-8533
IIci Cache Card, $129

Total Systems
1720 Willow Creek Circle
Eugene, OR 97402
800-874-2288
503-345-7395
QuickCache IIci, $259

Unbound, Inc.
17951 Lyons Circle
Huntington Beach, CA 92647
714-843-1895
RaidStor, $15,800 to $56,000

Xante Corp.
2559 Emogene Street
Mobile, AL 36606
800-926-8839
205-476-8189
Accel-a-Writer,
$1,395 (6 MB); $1,495
(8 MB); $2,095 (16 MB)

Xceed Technology
37560 31 Mile Road
Richmond, MI 48062
800-642-7661
313-727-4085
Xceed IIci, $289

others use the PDS, available in some Mac models. Some include RAM buffers that hold information temporarily when the speed of the drive and the speed at which your Mac wants to use the information aren't in sync. Note that some cards are meant to work only with drives made by the same manufacturer.

Even though Apple has neglected to set or support a SCSI-2 standard for the Mac, plenty of SCSI-2 options exist, such as the Arrow (Loviél), Data Cannon PDS (Storage Dimensions), DataStream (DayStar Digital), JackHammer (FWB), NuPort III (MicroNet), QuickSCSI (PLI), and SiliconExpress II (ATTO). Note, however, that there's no point in getting a SCSI-2 card unless your drive is faster than your Mac's built-in SCSI bus.

And for those of you who really want to be on the leading edge of technology, there's something called *redundant array of inexpensive disks,* or RAID. For the price of one or several Quadras, you can buy a system that spreads the data storage and retrieval simultaneously across two or more drives. If speed is much more of an issue for you than money, check out array systems: the MacinStor SpeedArray (Storage Dimensions), MiniArray (PLI), R1 Disk Array (Loviél), RaidStor (Unbound), Raven•040 (MicroNet), SledgeHammer (FWB), and XRAID (DynaTek).

Pumped-Up PRINTING

Printing is often the slowest part of using a Mac. So start with a laser printer, not with an impact printer such as an ImageWriter or an inkjet printer such as a StyleWriter. But if you think that picking a fast laser printer is just a matter of picking the one that has the highest ppm (page per minute) rating, think again.

The printing process has two basic components: The brain is the *controller,* which figures out how the pages should look, and the brawn is the *engine,* which mechanically churns out the pages (that's where the ppm ratings come from). A printer can be a smart wimp that figures out a page quickly and then slowly prints it out — not a bad solution for someone who prints single copies of complicated graphics. Or, on the other hand, it can be a muscle-bound moron that takes a long time to figure out how a page should look but then spits it out quickly — perfect for someone who needs multiple copies of relatively plain text documents.

When you use a non-PostScript laser printer (also called a QuickDraw printer, although QuickDraw is not built in), your Mac serves as the controller, sending the imaged page to the printer. PostScript laser printers, with their built-in controllers, are faster for most operations than are QuickDraw printers.

If you already have a laser printer and just want to speed it up, what can you do? Well, certain LaserWriter models can be upgraded, effectively turning them into other LaserWriter models. A IISC, IINT, or IINTX can be upgraded with an Apple-authorized upgrade to a IIf for $1,249; a IISC, IINT, IINTX, or IIf can be upgraded to a IIg for $2,249. You can also get memory upgrades for a IINTX (1 megabyte for $245 and 4 megabytes for $809) as well as for the IIf and IIg (4 megabytes for $269).

The only non-Apple printer-upgrade product is the Accel-a-Writer (Xante), which can make a LaserWriter IISC or IINT a little faster than a IINTX; it's also the only accelerator for the old LaserWriter Plus. But be very careful about accelerating any "old" LaserWriter: Sometimes the cost of the new card isn't much less than the cost of a newer, faster printer.

What can you do to speed up printing besides turning your printer into a different printer altogether? Here are a few ideas, although not every one is applicable to every printer model:

- **Add RAM.** The LaserWriter IINTX, IIf, and IIg can all take extra RAM. With more RAM, the printer can process complicated graphics without choking, and because there's more room for downloaded fonts to stay in memory, they don't have to be downloaded again during a work session.
- **Use a font cartridge.** Some non-Apple laser printers, such as those from QMS and Hewlett-Packard, can use font cartridges. Fonts from a cartridge can be accessed as quickly as built-in ROM fonts.
- **Add a hard drive.** If the printer has a SCSI port, add a hard drive. Fonts fed in from an attached drive arrive faster than those from your computer.
- **Add an extra paper tray.** There's also the mundane but effective option of adding an extra paper tray that can hold much more paper than the standard-issue tray. It doesn't make the actual printing any faster, but a small paper tray can be a serious bottleneck in high-volume printing.

Certain printing strategies also make printing faster: Use the printer's built-in fonts, for instance, or manually download fonts *before* starting a print job.

If you want a fast Mac system, remember it's just that: a *system,* built of various components, all with their own speed limits. Plan a balanced system, because there's no sense in having a screaming SCSI mode if you have a sluggish hard drive. Figure out where your system's bottlenecks are in light of the kind of work you do. And finally, when you outgrow your system, consider the upgrade costs carefully. Sometimes selling your current Mac system (it will certainly meet *someone's* needs) and buying a new one is more cost-effective than pursuing multiple upgrade options.

Sharon Zardetto Aker is a free-lance writer who, after writing this article, finds that her Mac is slower than it used to be.

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3.5-Inch Magneto-Optical Drives

These safe, reliable optical drives deliver near-hard-drive speed — but are the prices low enough yet?

Removable-media drives come in two flavors — magnetic and magneto-optical — and provide virtually unlimited storage capacity. Magneto-optical drives aren't as fast or as affordable as magnetic-media alternatives such as SyQuest drives, but they offer significant advantages. A 128-megabyte magneto-optical cartridge costs half as much as an 88-megabyte SyQuest cartridge. Even more important, optical media are safer and more durable than magnetic media, which counts for a lot if you're relying on them for archival storage.

In our last look at 3.5-inch optical drives (see "Pocket Opticals: 3.5-Inch Magneto-Optical Drives," July '92; Buyer's Guide page 10), only drives based on the 128-megabyte IBM, MOST, and Sony mechanisms were available, and compatibility problems between mechanisms and media were significant. Today, magneto-optical drives are faster, and compatibility is less of an issue. Several of the drives we reviewed for this report use a new 256-megabyte mechanism that can also read from and write to 128-megabyte cartridges.



The 3.5-inch magneto-optical drives discussed in this report are faster and more compatible with each other than those in our July 1992 report.

Although the ability to use 256-megabyte cartridges is the latest development in magneto-optical drives, keep in mind that no universal standard has been adopted to date. Stay tuned: We expect the ISO (International Standards Organization) to establish such a standard within the next couple of years. Also, although prices have dropped, a magneto-optical unit is still about twice as expensive as its magnetic counterpart.

Choice Performers

Dozens of vendors sell 3.5-inch optical drives. In our July 1992 report, the 10 drives we tested were based on one of three mechanisms. This month, we subjected 27 new optical drives, based on one of seven mechanisms, to our suite of application-based speed tests and our battery of design, construction, service, packaging, documentation, and software examinations. We compared the results with those of the DGR 128REM, a "Bottom Line" pick in our July 1992 report.

Three of the four fastest drives we tested — the DGR 256REM, the Liberty 115MO2, and the MacProducts Magic 256MB REM — use the new 256-megabyte MOST 5200-S mechanism. Even with the same formatting software, however, speed varied by as much as 25 percent from one drive to the other in some tests. According to MOST, the differences may be because the models we received for this review were early shipping units and newer ones should perform better and more consistently.

Of the 128-megabyte drives, the fastest were based on the Epson OMD-5010 mechanism (the DGR 128REM Turbo, MacProducts Magic 128MB Turbo, and PLI Infinity Optical 3.5E) and on the MOST 5100-S 128-megabyte mechanism (the DGR 128REM, Generation 128MB Optical Drive, Liberty 115MO, MacProducts Magic 128MB REM, Mirror 128MB Optical Drive, and Saturae Vision 128).

We found that by far the most significant factor determining drive speed was the type of mechanism the drive used. Speed differences among drives using the same mechanism almost never exceeded 7 percent. An exception was the Sony-mechanism-based MicroNet drive, which was the second-slowest in the review and was consistently 18 percent slower than the other drives based on the Sony mechanism. We traced the cause to MicroNet's formatting software, SCSI Utility. When we used FWB's Hard Disk ToolKit, Personal Edition, on the MicroNet drive, the drive performed as well as the other Sony-mechanism-based models; conversely, when we used MicroNet's software on the other Sony-mechanism-based drives, their speed suffered.

Overall, even though the speeds of magneto-optical drives are greater than they were a year ago,

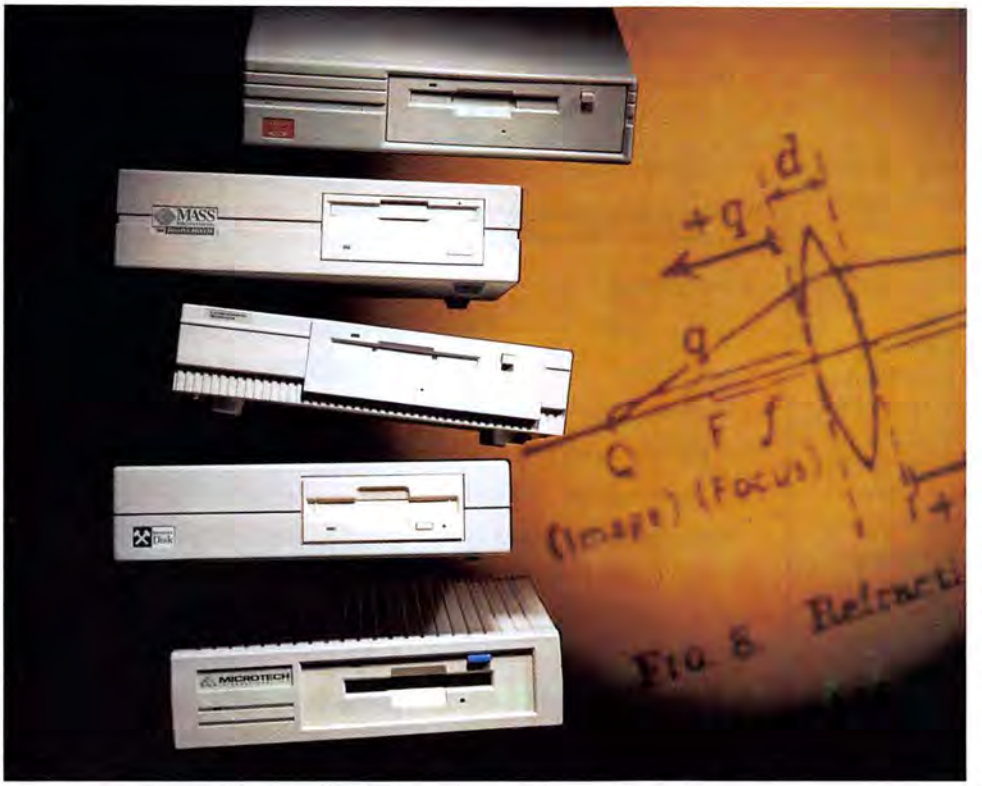


Figure 1: Standing out from the crowd (from top to bottom): the DGR 256REM, Mass Microsystems DataPak MO/128, Generation Systems 128MB Optical Drive, FWB hammerDisk 130, and Microtech Genesis 120.

PHOTOGRAPHY: GIAMPIERO BENVENUTI

the fastest of these drives is still slower than a standard 80-megabyte hard drive.

Getting Along

Compatibility is an important consideration for archiving, because you might not be using a cartridge with the drive on which it was formatted when you eventually retrieve your archived data. Also, as more service bureaus invest in 3.5-inch magneto-optical drives, desktop publishers will want to buy a drive that is compatible with drives that use different formatting software. Fortunately, we found that many of the drives were compatible with cartridges formatted with other vendors' software (see Table 1).

Neither MicroNet nor Tass Optical sent us a driver extension for mounting cartridges with their drives. Although you can mount cartridges on these drives when you initially start up your system, mounting cartridges after startup requires either restarting your Macintosh or using a mounting utility such as SCSI Probe. Panasonic was the only vendor that didn't include software or a Mac cable; its optional Macintosh interface kit costs $125. Because Panasonic did not send us its software in time for testing, we used FWB's Hard Disk ToolKit, Personal Edition, for testing its drive.

Clear as Mud

For the uninitiated, setting up a 3.5-inch magneto-optical drive can seem like a daunting task. Many of the drives come with two manuals: one that covers the use of the utility software and another that covers hardware installation. FWB ships Hard Disk ToolKit (HDT) with its drives; other companies such as DGR, Liberty, MacProducts, and Third Wave, ship Hard Disk ToolKit, Personal Edition (HDT PE), a scaled-down version. Saturae ships its drive with an older version of HDT PE called HDT Lite. FWB does an excellent job of describing the various versions of HDT in its software documentation. La Cie, Mass Microsystems, PLI, and Sony also supply detailed, well-organized documentation.

After installing each drive, we examined the bundled software to see how much control it provides for formatting the cartridge and how easy it is to use. The formatting applications that provide the most control and diagnostic information are FWB's HDT and La Cie's Silverlining, although of the two, we found HDT's interface friendlier. HDT PE offers the same formatting features as the full version of the software, but it is slower.

Microtech ships its own formatting software but also includes the well-known Norton Utilities, so users can not only create partitions and password-protect them but can also use data encryption, a backup utility, and disk optimization.

As we went to press, DGR and MacProducts notified us that they would be shipping CharisMac's Anubis formatter instead of HDT

PE and would offer a free upgrade to all customers who had previously purchased drives with HDT PE. One important advantage Anubis has over HDT PE is its ability to turn write-verify off, which is useful when sheer speed is more important than data integrity — as when you're working with a temporary copy of a large database.

Not Just a Pretty Face

As with any computer peripheral, the fastest internal mechanism can't make up for a poorly constructed case — there's not much sense in buying a fast mechanism if the power supply is too wimpy or if the internal wiring is prone to melting.

Most of the drives had quality construction. Some drives have plastic cases, which allow a drive to get hotter than if it had a metal case. Metal cases allow heat to dissipate, whereas plastic cases act as insulators and trap heat around the mechanism. Plastic cases also cannot block electromagnetic interference from power supplies. Some vendors spray the inside of plastic cases with a chemical coating that blocks interference. The cases from OAI (Optical Access International) and Tulin are plastic but offer no protection from electromagnetic interference. The Dynatek ROS 128 has a plastic case, but an internal metal chassis shields the power supply and blocks interference.

Liberty Systems offers compact and well-designed drives in metal cases. Because the drives are internally terminated, you can place them only at the end of your SCSI chain. The Liberty 70MO also lacks a fan, which is important for cooling the optical mechanism — magneto-optical drives heat the cartridge with a laser to write data, and overheating can shorten your drive's life.

Finally, we cut open each drive's SCSI cable. A quality cable should have signal lines paired and twisted and wrapped in a foil insulator and a metal braid to ensure safe and consistent data transfer. DGR, FWB, Generation Systems, MicroNet, Microtech, Mirror, OAI, PLI, and Sony get top honors for including high-quality cables. MacProducts, Relax, Rodime, Saturae, Tass Optical, and Third Wave ship cables with foil insulation only. If you attach more than a couple of drives to your Mac with these flimsy SCSI cables, you may experience problems mounting your drives.

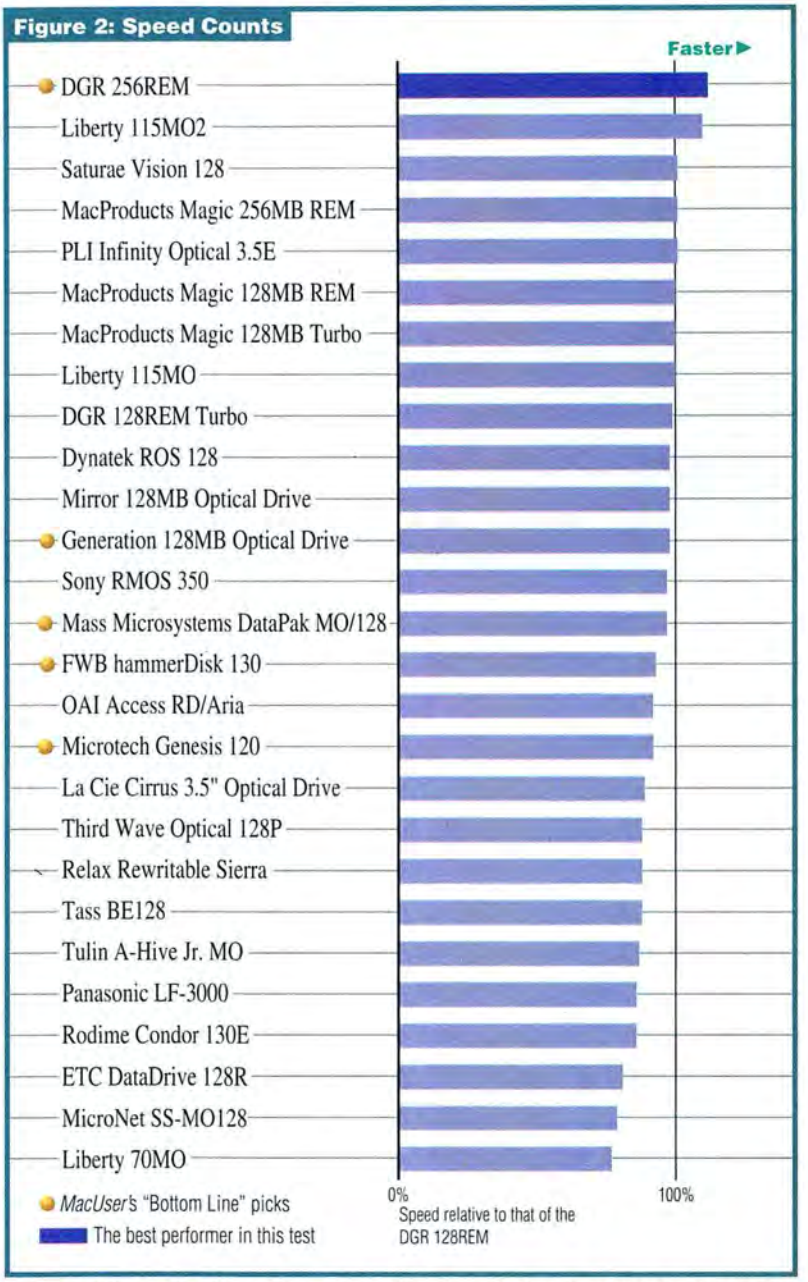


Figure 2: We ran the drives through a suite of application-based tests. We sorted a 4th Dimension database to gauge access speed; copied a 13-megabyte file, using DiskTop, to examine sustained throughput; duplicated a large file in the Finder, to test the mechanism's speed; and manipulated an image in Photoshop, to exercise all aspects of mechanism operation. We compared the results with those of the DGR 128REM, a "Bottom Line" pick in our July 1992 lab report.

An important aspect of a quality drive is after-sale support from the vendor or from an authorized dealer. We don't think asking for a 30-day money-back guarantee, 48-hour guaranteed turnaround time for repairs, and fast and effective technical support is unreasonable.

Microtech, PLI, Rodime Systems, and Tass Optical get kudos for providing a two-year standard warranty — other companies offer only a one-year warranty (see Table 2). We tested each company's promise of after-sale support by calling its technical-support staff with a problem. We mounted a cartridge, turned on file sharing, and then tried to eject the cartridge — you cannot eject a cartridge unless you turn file sharing off. Most vendors were able to get us the right answer within half an hour; however, Rodime Systems took a full day to get back to us.

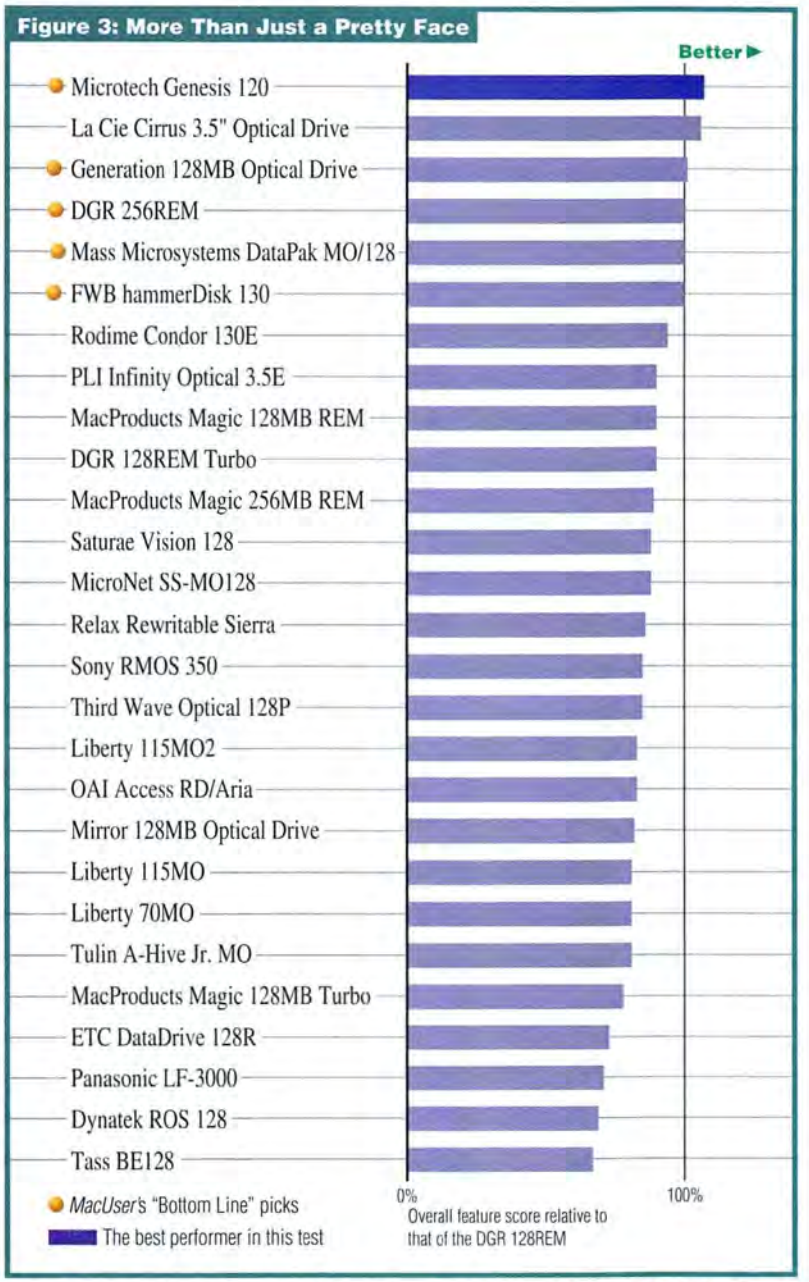


Figure 3: We evaluated each drive's design and construction by examining the quality of the SCSI cable, the internal wiring, and the electromagnetic shielding. We also looked at the quality and completeness of the packaging, the quality of the documentation, and the amount and quality of after-sale support. We compared the resulting scores with those of the DGR 128REM, one of the "Bottom Line" picks in our July 1992 lab report.

Because magneto-optical drives are designed and marketed as storage devices for personal computers, they should have an FCC Class B certification for use in residential situations. When we first reviewed magneto-optical drives, only 3 out of the 10 had any sort of FCC certification. More of the drives in this month's report are Class B-certified, but 11 still did not have Class B certification at press time (although vendors may be in the process of getting it). Because we do not recommend that you buy a drive that is not Class B-certified, we suggest that you check with a vendor about FCC compliance before you make a buying decision.

The Bottom Line

Magneto-optical drives provide removable storage that is both durable and inexpensive. These qualities make them ideal for archiving important data as well as for use by desktop publishers who frequently deal with large files. In a pinch, these drives are also fast enough to use as a second hard drive. Since our last report, in July 1992, prices have dropped (they'll probably get even lower); speed has improved; and most important, compatibility among drives has increased.

Of the drives we reviewed for this report, the three 256-megabyte drives offered the lowest price per megabyte. The DGR 256REM ($1,699 direct) was not only the fastest drive we tested but it can also store 256 megabytes of data on a single cartridge — and it is able to

Table 1: Cartridge Compatibility

Key

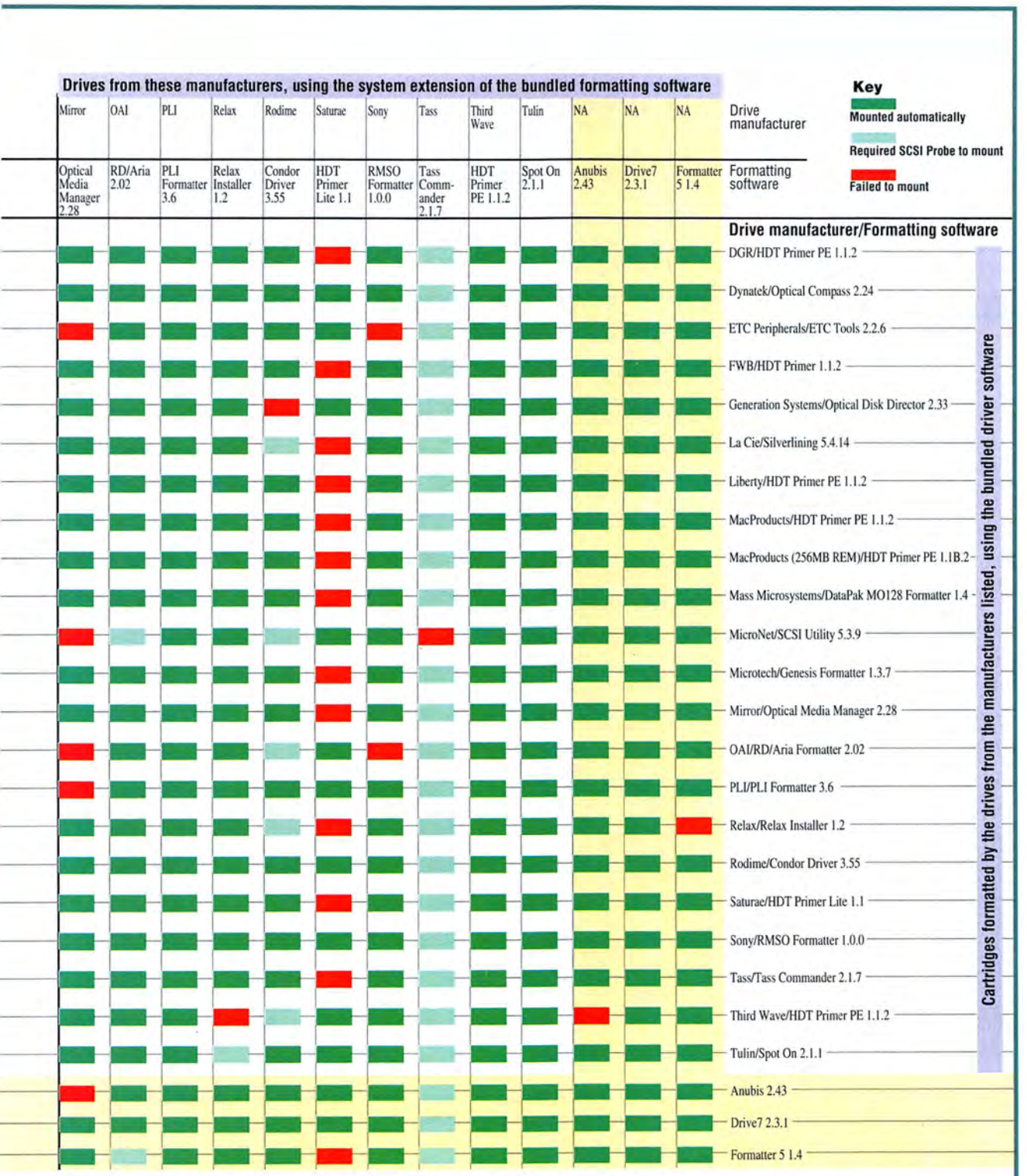
- Mounted automatically
- Required SCSI Probe to mount
- Failed to mount

Drives from these manufacturers, using the system extension of the bundled formatting software

Drive manufacturer	DGR	Dynatek	ETC Peripherals	FWB	Generation Systems	La Cie	Liberty	Mac-Products	Mac-Products (256MB REM)	Mass Micro-systems	MicroNet	Micro-tech
Formatting software	HDT Primer PE 1.1.2	Optical Compass 2.24	ETC Tools 2.2.6	HDT Primer 1.1.2	Optical Disk Director 2.33	Silver-lining 5.4.14	HDT Primer PE 1.1.2	HDT Primer PE 1.1.2	HDT Primer PE 1.1B.2	DataPak MO/128 Formatter 1.4	SCSI Utility 5.3.9	Genesis Formatter 1.3.7
Drive manufacturer/Formatting software												
DGR/HDT Primer PE 1.1.2	■	■	■	■	■	■	■	■	■	■	■	■
Dynatek/Optical Compass 2.24	■	■	■	■	■	■	■	■	■	■	■	■
ETC Peripherals/ETC Tools 2.2.6	■	■	■	■	■	■	■	■	■	■	▒	■
FWB/HDT Primer 1.1.2	■	■	■	■	■	■	■	■	■	■	■	■
Generation Systems/Optical Disk Director 2.33	■	■	■	■	■	■	■	■	■	■	▒	■
La Cie/Silverlining 5.4.14	■	■	■	■	■	■	■	■	■	■	■	■
Liberty/HDT Primer PE 1.1.2	■	■	■	■	■	■	■	■	■	■	■	■
MacProducts/HDT Primer PE 1.1.2	■	■	■	■	■	■	■	■	■	■	■	■
MacProducts (256MB REM)/HDT Primer PE 1.1B.2	■	■	■	■	■	■	■	■	■	■	■	■
Mass Microsystems/DataPak MO/128 Formatter 1.4	■	■	■	■	■	■	■	■	■	■	▒	■
MicroNet/SCSI Utility 5.3.9	■	■	■	■	■	■	■	■	■	■	▒	■
Microtech/Genesis Formatter 1.3.7	■	■	■	■	■	■	■	■	■	■	■	■
Mirror/Optical Media Manager 2.28	■	■	■	■	■	■	■	■	■	■	▒	■
OAI/RD/Aria Formatter 2.02	■	■	■	■	■	■	■	■	■	■	■	■
PLI/PLI Formatter 3.6	■	■	■	■	■	■	■	■	■	■	▒	■
Relax/Relax Installer 1.2	■	■	■	■	■	■	■	■	■	■	■	■
Rodime/Condor Driver 3.55	■	■	■	■	■	■	■	■	■	■	■	■
Saturae/HDT Primer Lite 1.1	■	■	■	■	■	■	■	■	■	■	■	■
Sony/RMSO Formatter 1.0.0	■	■	■	■	■	■	■	■	■	■	■	■
Tass/Tass Commander 2.1.7	■	■	■	■	■	■	■	■	■	■	■	■
Third Wave/HDT Primer PE 1.1.2	■	■	■	■	■	■	■	■	■	■	■	■
Tulin/Spot On 2.1.1	■	■	■	■	■	■	■	■	■	■	▒	■
Anubis 2.43	■	■	■	■	■	■	■	■	■	■	■	■
Drive7 2.3.1	■	■	■	■	■	■	■	■	■	■	■	■
Formatter 5 1.4	■	■	■	■	■	■	■	■	■	■	■	■

Cartridges formatted by the drives from the manufacturers listed, using the bundled driver software

Table 1: For a 3.5-inch optical drive to be useful for archiving or for transporting data, the cartridge must be mountable with different drives and formatting software. In order to test the compatibility of each drive's formatting software with that of other vendors, we inserted a cartridge and loaded the drive's system extension. After startup, we inserted a cartridge



formatted on another drive. We then observed whether the cartridge mounted automatically, required SCSI Probe, or failed to mount. Neither Tass nor MicroNet includes an extension as part of its formatting software. Consequently, although each can mount cartridges upon startup, neither can mount cartridges after startup and both require SCSI Probe after startup.

read from and write to 128-megabyte cartridges.

As an overall package, the Microtech Genesis 120 ($1,899 list, $1,575 street) offers acceptable speed for the price, combined with good after-sale service. The Genesis 120 comes with excellent documentation, easy-to-use software, and a two-year warranty. If you're a novice in need of a little handholding, this is your best bet.

For those who are looking for solid construction, the well-designed Mass Microsystems DataPak MO/128 ($1,799 list, $1,550 street) was the best-built drive we tested.

The FWB hammerDisk 130 ($1,959 list, $1,600 street) and the Generation Systems 128MB Optical Drive ($1,689 list, $1,530 street) were also fast and provided good documentation.

However, one of our "Bottom Line" picks in July 1992, the DGR 128REM ($1,199 direct), still offers the best combination of low price and acceptable speed.

We do not recommend that you buy a drive that lacks FCC Class B certification — several drives just missed being "Bottom Line" picks because of this. Check with vendors to find out current FCC-certification status.

— Mark Frost

Table 2: Service with a Smile

● = yes ○ = no	Standard warranty	Extended warranty	Service center	Money-back guarantee	48-hour turnaround	Toll-free tech support	Data-recovery service
DGR Technologies	1 year	○	vendor	30 days	○	●	free
Dynatek	1 year	○	dealer	none	●	○	none
ETC Peripherals	1 year*	9.5%/year*	dealer/vendor	none	○*	●	$45
FWB	1 year	○	dealer/vendor	none	●	○	free
Generation Systems	1 year	○	dealer/vendor	none	●	●	$217†
La Cie	1 year	○	vendor	30 days	○	●	$150
Liberty Systems	1 year	○	vendor	30 days	●	○	$60/hr
MacProducts USA	1 year	10%/year	vendor	30 days	○	○	free
Mass Microsystems	1 year	○	dealer	none	○	●	none
MicroNet Technology	1 year	$129/year	dealer	none	●	○	none
Microtech International	2 years	○	vendor	none	●	●	free
Mirror Technologies	1 year	10%/year§	vendor	30 days	●	○	$217†
OAI (Optical Access International)	1 year	○	dealer/vendor	30 days	●	●	$35
Panasonic	1 year	○	dealer	none	●	●	none
PLI (Peripheral Land, Inc.)	2 years	10%/year§	vendor	15 days◊	○	●	free
Relax Technology	1 year	○	vendor	30 days	●	○	$65; $40/hr**
Rodime Systems	2 years	○	vendor	none	○	○	free
Saturae	1 year	○	vendor	none	●	●	free
Sony	1 year	○	dealer	none	●	○	none
Tass Optical World	2 years	$225/year	dealer/vendor	30 days	○	○	free
Third Wave Computing	1 year	○	vendor	30 days	○	●	free
Tulin Technology	1 year	$75/year	vendor	none	●††	○	$75/hr§§

*ETC offers the Club 24 warranty for 9.5% of the purchase price at the time of purchase. This 2-year warranty comes with a 48-hour guaranteed turnaround time for repairs. You can purchase a Club 12 warranty after purchase for 18% of the purchase price.

†Generation Systems and Mirror charge only $50 if data recovery is unsuccessful.

§The price of an extended warranty is 10% per year for 3 years.

◊PLI offers a 15-day money-back guarantee. If you return the product within 30 days, you will be issued a credit on a future purchase.

**There is an initial setup fee of $65 in addition to the $40 per hour for data recovery.

††The 48-hour guaranteed turnaround time for repairs is applicable only within the first 30 days.

§§The first half hour of data recovery is free.

Table 3: Features of 3.5-Inch Magneto-Optical Drives

● = yes ○ = no	DGR 128REM Turbo $$$	DGR 256REM $$$$	Dynatek ROS 128 $$$	ETC DataDrive 128R $$$	FWB hammerDisk 130 $$$$
List price	$1,299	$1,699	$2,095	$1,669	$1,959
Street price	$1,299 (direct)	$1,699 (direct)	$2,000	$1,335	$1,600
Additional-cartridge price	$59	$99	$79	$49	$66
Pros	Good tech support.	Good tech support. AC outlets.	INIT automatically installed. Compatible with all formatted cartridges.	Good software and manual. Shipped with System 7.0.1. Front-mounted power switch.	Good documentation. Powerful software. Compatible with all formatted cartridges.
Cons	Manual not specific to drive. No FCC Class B certification.	Manual not specific to drive.	Slow response by tech support. No FCC Class B certification.	Slow, loud mechanism. No FCC Class B certification.	Cartridge eject is too forceful.
Hardware					
Formatted capacity	119.4 MB	239.7 MB	119.4 MB	119.4 MB	119.4 MB
Internal mechanism	Epson OMD-5010	MOST 5200-S	Sony SMO-301	Teac OD-3000	Matsushita LF-3000
SCSI-ID selector	push wheel	push wheel	push wheel	push wheel	push wheel
SCSI termination	external	external	external	external	external
Size (L x W x H)	9.5 x 7 x 2.5 in.	10 x 9.5 x 2.5 in.	10 x 10 x 3 in.	10.5 x 9.5 x 2.5 in.	9.5 x 9.5 x 2.5 in.
Case material	metal	metal	plastic (metal chassis)	metal	metal
Fuse	internal	external	external	internal	external
AC outlets	none	2	none	none	none
Software					
Bundled software	HDT PE	HDT PE	none	none	HDT
Formatter	HDT Primer PE 1.1.2	HDT Primer PE 1.1.2	Optical Compass 2.24	ETC Tools 2.2.6	HDT Primer 1.1.2
Partitioning	●	●	●	○	●
Backup	○	○	○	○	○
Password protection	●	●	●	○	●
Data encryption	●	●	○	○	●
File recovery	○	○	○	○	○
Disk optimization	○	○	○	○	○
FCC Class B certification	○	●	○	○	●
Company	DGR Technologies, Inc. 1219 W. Sixth St. Ste. 205 Austin, TX 78703 800-235-9748 512-476-9855 512-476-6399 (fax)	DGR Technologies, Inc. 1219 W. Sixth St. Ste. 205 Austin, TX 78703 800-235-9748 512-476-9855 512-476-6399 (fax)	Dynatek 15 Tangiers Rd. Toronto, ON M3J 2B1 Canada 416-636-3000 416-636-3011 (fax)	ETC Peripherals, Inc. 5426 Beaumont Ctr. Blvd. Tampa, FL 33634 800-876-4382 813-884-2863 813-888-9593 (fax)	FWB, Inc. 2040 Polk St. Ste. 215 San Francisco, CA 94109 415-474-8055 415-775-2125 (fax)

Exceptional features are circled in red.

3.5-Inch Magneto-Optical Drives

Table 3: Features of 3.5-Inch Magneto-Optical Drives, continued

● = yes ○ = no	Generation 128MB Optical Drive $$$$	La Cie Cirrus 3.5" Optical Drive $$$½	Liberty 70MO $$$	Liberty 115MO $$$	Liberty 115MO2 $$$½
List price	$1,689	$1,499	$1,599*	$1,499*	$1,799*
Street price	$1,530	$1,499 (direct)	$1,599 (direct)*	$1,499 (direct)*	$1,799 (direct)*
Additional-cartridge price	$79	$79	$49	$49	$79 (256 MB)
Pros	AC outlets. Good documentation. Extension installs automatically.	Well designed. Portable. Ships with System 6.0.7 and 7.0 and System Switcher.	Nice black case and carrier. Portable.	Nice black case and carrier. Portable.	Nice black case and carrier. Portable.
Cons		25-pin SCSI cable. DIP switches for SCSI ID. No FCC Class B certification.	Internally terminated. Loud mechanism. Insufficient hardware documentation. No fan for cooling drive.	Internally terminated. Insufficient hardware documentation.	Internally terminated. Insufficient hardware documentation.
Hardware					
Formatted capacity	119.4 MB	119.4 MB	119.4 MB	119.4 MB	239.7 MB
Internal mechanism	MOST 5100-S	Matsushita LF-3000	Teac OD-3000	MOST 5100-S	MOST 5200-S
SCSI-ID selector	push wheel	DIP switches	dial	dial	dial
SCSI termination	external	external	internal	internal	internal
Size (L x W x H)	11 x 10 x 2.5 in.	9.5 x 6 x 3 in.	7.5 x 5 x 2 in.	9.5 x 7.5 x 2 in.	9.5 x 7.5 x 2 in.
Case material	metal	plastic/EMI	metal	metal	metal
Fuse	external	internal	internal	internal	internal
AC outlets	2	none	none	none	none
Software					
Bundled software	Microlytics GOfer, Inside Information	Silverlining	HDT PE	HDT PE	HDT PE
Formatter	Optical Disk Director 2.33	Silverlining 5.4.14	HDT Primer PE 1.1.2	HDT Primer PE 1.1.2	HDT Primer PE 1.1.2
Partitioning	●	●	●	●	●
Backup	●	○	○	○	○
Password protection	●	●	●	●	●
Data encryption	○	○	●	●	●
File recovery	○	●	○	○	○
Disk optimization	○	●	○	○	○
FCC Class B certification	●	○	●	●	●
Company	Generation Systems 2648 Patton Rd. St. Paul, MN 55113 800-325-5811 612-628-6232 612-633-1083 (fax)	La Cie Ltd. 8700 S.W. Creekside Pl. Beaverton, OR 97005 800-288-9919 503-520-9000 503-520-9100 (fax)	Liberty Systems, Inc. 160 Saratoga Ave. Ste. 38 Santa Clara, CA 95051 408-983-1127 408-243-2885 (fax)	Liberty Systems, Inc. 160 Saratoga Ave. Ste. 38 Santa Clara, CA 95051 408-983-1127 408-243-2885 (fax)	Liberty Systems, Inc. 160 Saratoga Ave. Ste. 38 Santa Clara, CA 95051 408-983-1127 408-243-2885 (fax)

Exceptional features are circled in red.

*Cartridge not included.

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The RealTech Laser Printer. First of its kind, and the best value in its class. Available exclusively through Hardware That Fits.

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WINNER
MacWEEK
1991
TARGET AWARD

★★★★½

"The RealTech features not just a genuine Adobe interpreter, but also a PostScript Level 2 raster image processor (RIP), which earns it more than a few points for forward compatibility."

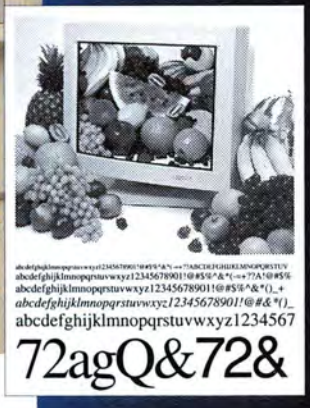
— PUBLISH MAGAZINE. February 1992

★★★★

— MACWORLD MAGAZINE September 1992



Based on its ranking in an impartial test of performance, the RealTech Laser was chosen for MacUser's cover. For complete information see MacUser, September 1992 issue.



If you need to print complex graphics on a daily basis or large quantities of high-quality, time-sensitive documents, the RealTech Laser is the ideal solution. Designed for multi-user networking and mixed-platform environments.

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CIRCLE 92 ON READER SERVICE CARD.

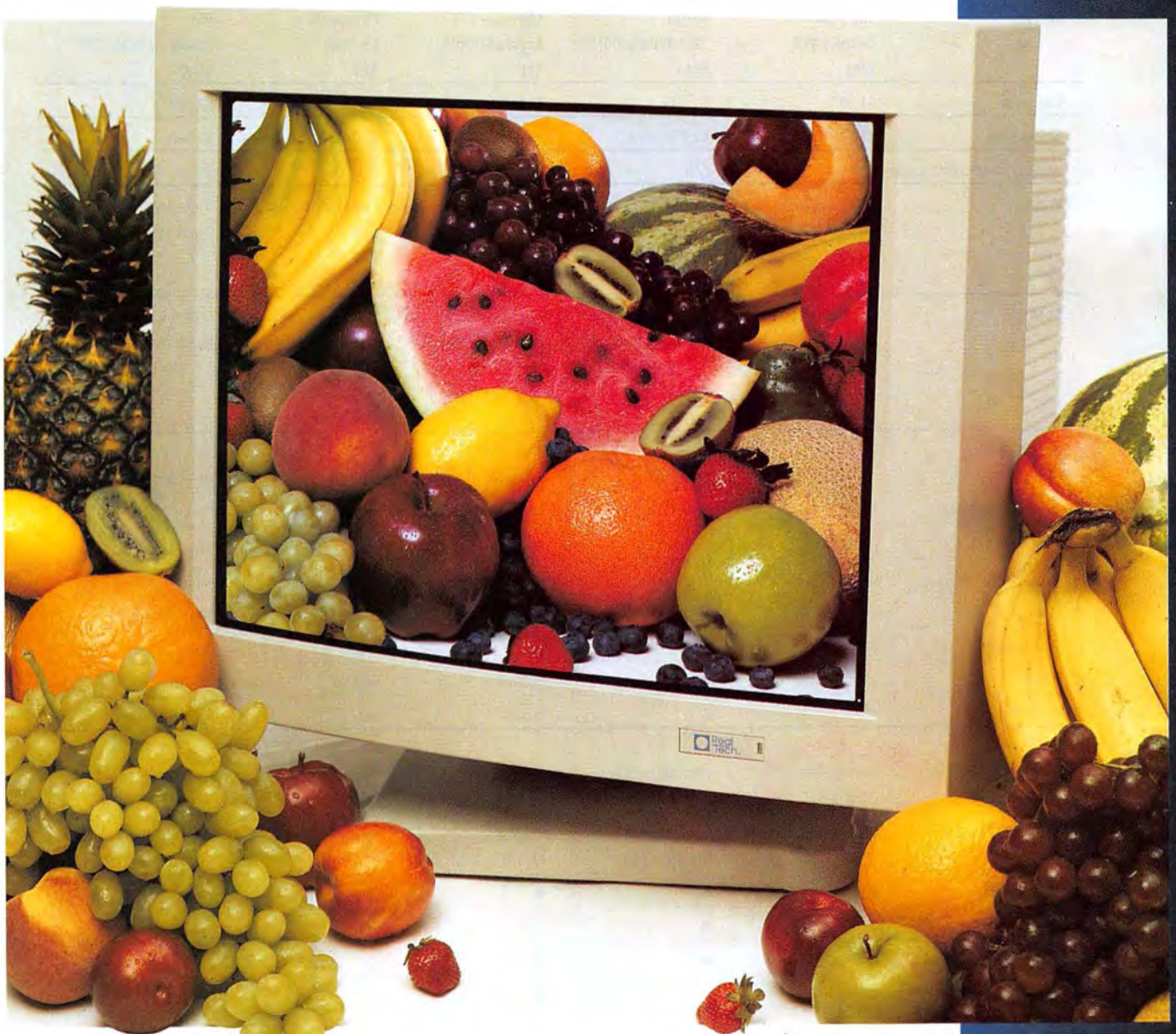
Table 3: Features of 3.5-Inch Magneto-Optical Drives, continued

● = yes ○ = no	MacProducts Magic128MB REM †††½	MacProducts Magic128MB Turbo †††½	MacProducts Magic256MB REM †††½	Mass Microsystems DataPak MO/128 ††††	MicroNet SS-MO128 ††½
List price	$1,199	$1,275	$1,699	$1,799	$1,995
Street price	$990	$1,080	$1,430	$1,550	$1,470
Additional-cartridge price	$59	$59	$99	$69	$69
Pros	AC outlets.	Ships with System 7.0.1.	Ships with System 7.0.1 and shareware. AC outlets.	Good design and construction. AC outlets. Good documentation.	Good tech support.
Cons	Manual not specific to drive. No FCC Class B certification.	Manual not specific to drive. No FCC Class B certification.	Manual not specific to drive. No FCC Class B certification.	Formatting software has limited number of features.	No software for auto-mounting cartridges. Poor documentation.
Hardware					
Formatted capacity	119.4 MB	119.4 MB	239.7 MB	119.4 MB	119.4 MB
Internal mechanism	MOST 5100-S	Epson OMD-5010	MOST 5200-S	Sony SMO-301	Sony SMO-301
SCSI-ID selector	push wheel	push wheel	push wheel	push wheel	push wheel
SCSI termination	external	external	external	external	external
Size (L x W x H)	10 x 9.5 x 2.5 in.	9 x 7 x 2.5 in.	10 x 9.5 x 2.5 in.	10 x 9.5 x 2.5 in.	10 x 5 x 4 in.
Case material	metal	metal	metal	metal	metal
Fuse	internal	external	external	internal	internal
AC outlets	2	none	2	2	none
Software					
Bundled software	HDT PE	HDT PE	HDT PE	7th Heaven Utilities	none
Formatter	HDT Primer PE 1.1.2	HDT Primer PE 1.1.2	HDT Primer PE 1.1.2	DataPak MO/128 Formatter 1.4	SCSI Utility 5.3.9
Partitioning	●	●	●	●	●
Backup	○	○	○	○	●
Password protection	●	●	●	○	●
Data encryption	●	●	●	○	○
File recovery	○	○	○	○	○
Disk optimization	○	○	○	○	○
FCC Class B certification	○	○	○	●	●
Company	MacProducts USA 608 W. 22nd St. Austin, TX 78705 800-622-3475 512-472-8881 512-499-0888 (fax)	MacProducts USA 608 W. 22nd St. Austin, TX 78705 800-622-3475 512-472-8881 512-499-0888 (fax)	MacProducts USA 608 W. 22nd St. Austin, TX 78705 800-622-3475 512-472-8881 512-499-0888 (fax)	Mass Microsystems, Inc. 810 W. Maude Ave. Sunnyvale, CA 94086 800-522-7979 408-522-1200 408-733-5499 (fax)	MicroNet Technology, Inc. 20 Mason Irvine, CA 92718 714-837-6033 714-837-1164 (fax)

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- 1024x768 standard resolution
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- Compatible with Radius, RasterOps, RealTech & SuperMac video cards

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CIRCLE 93 ON READER SERVICE CARD.

Table 3: Features of 3.5-Inch Magneto-Optical Drives, continued

● = yes ○ = no	Microtech Genesis 120 tttt	Mirror 128MB Optical Drive ttt½	OAI Access RD/Aria ttt½	Panasonic LF-3000 tt½	PLI Infinity Optical 3.5E tttt
List price	$1,899	$1,299	$1,995	$2,195	$1,899
Street price	$1,575	$1,299 (direct)	$1,690	$2,100	$1,390
Additional-cartridge price	$99	$59	$79	$89	$99
Pros	2-year warranty. Norton Utilities bundled.	AC outlets. Shareware. Good documentation. Extension installs automatically.	Portable.	Good design and construction. Air filter.	Good documentation. 2-year warranty.
Cons	Tech support answered our question incorrectly.	Incompatible with cartridges formatted with other vendors' software.	Plastic case has no EMI shielding.	Poor tech support. Mac software and SCSI cable not included. No FCC Class B certification.	DIP-switch settings for termination.
Hardware					
Formatted capacity	119.4 MB	119.4 MB	119.6 MB	119.4 MB	119.4 MB
Internal mechanism	IBM MD-3125B	MOST 5100-S	Matsushita LF-3000	Matsushita LF-3000	Epson OMD-5010
SCSI-ID selector	push button	push wheel	push wheel	dial	dial
SCSI termination	external	external	external	external	external
Size (L x W x H)	10.5 x 9.5 x 2.5 in.	11 x 9.5 x 2.5 in.	8.5 x 6.5 x 2.5 in.	9.5 x 4 x 6 in.	10 x 10 x 2.5 in.
Case material	plastic/EMI	metal	plastic	metal	metal
Fuse	external	external	internal	internal	external
AC outlets	none	2	none	none	none
Software					
Bundled software	Norton Utilities, Lifeguard	Microlytics GOfer, Inside Information	none	Corel formatter and Mac cable, $125	none
Formatter	Genesis Formatter 1.3.7	Optical Media Manager 2.28	RD/Aria Formatter 2.02	optional	PLI Formatter 3.6
Partitioning	●	●	●	○	●
Backup	●	●	○	○	○
Password protection	●	●	●	○	○
Data encryption	●	○	●	○	○
File recovery	●	○	○	○	○
Disk optimization	●	○	○	○	●
FCC Class B certification	●	●	●	○	●
Company	Microtech International, Inc. 158 Commerce St. East Haven, CT 06512 800-626-4276 203-468-6223 203-468-6466 (fax)	Mirror Technologies, Inc. 2644 Patton Rd. Roseville, MN 55113 800-654-5294 612-633-4450 612-633-3136 (fax)	OAI (Optical Access International) 800 W. Cummings Pk. #2050 Woburn, MA 01801 800-433-5133 617-937-3910 617-937-3950 (fax)	Panasonic Office Automation Group 2 Panasonic Way Secaucus, NJ 07094 800-222-0584 201-348-7000	PLI (Peripheral Land, Inc.) 47421 Bayside Pkwy. Fremont, CA 94538 800-288-8754 510-657-2211 510-683-9713 (fax)

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Now you don't have to buy two separate scanners for reflective art and transparencies. And the quality is so good you can actually use the separations for printing. We did!*

** The party picture shown above originated as an 8x10 color transparency. It was scanned on the RealTech Scan 800 (with Transparency Option), adjusted with ScanMatch color calibration software, and color-corrected with Adobe Photoshop.*

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- 24-bit color or 8-bit grayscale
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CIRCLE 94 ON READER SERVICE CARD.

3.5-Inch Magneto-Optical Drives

Table 3: Features of 3.5-Inch Magneto-Optical Drives, continued

● = yes ○ = no	Relax Rewritable Sierra ŧŧŧ½	Rodime Condor 130E ŧŧŧ	Saturae Vision 128 ŧŧŧ½	Sony RMOS 350 ŧŧŧ	Tass BE 128 ŧŧ
List price	$1,299	$2,199	$1,289	$2,295	$1,595
Street price	$1,299 (direct)	$2,199 (direct)	$1,289 (direct)	$1,675	$1,590
Additional-cartridge price	$39	$99	$48	$60	$99
Pros	Compact case.	2-year warranty.	Excellent customer service.	Well-designed air filter.	2-year warranty.
Cons	Large external brick power supply.	Extension software inconsistent when mounting cartridges formatted with other vendors' software.	Incompatible with cartridges formatted with other vendors' software.	DIP switches for SCSI ID. Large and bulky.	No extension for auto-mounting cartridges. No FCC Class B certification.
Hardware					
Formatted capacity	119.4 MB	119.4 MB	119.4 MB	119.4 MB	119.4 MB
Internal mechanism	Ricoh LF-3000	Ricoh LF-3000	MOST 5100-S	Sony SMO-301	Ricoh LF-3000
SCSI-ID selector	push wheel	push wheel	push wheel	DIP switches	push wheel
SCSI termination	external	external	external	external	external
Size (L x W x H)	8.5 x 5.5 x 2 in.	10 x 10 x 2.5 in.	10 x 9.5 x 2.5 in.	11 x 10 x 3 in.	9 x 5 x 4 in.
Case material	metal	metal	metal	metal	metal
Fuse	metal	internal	internal	internal	internal
AC outlets	none	none	none	none	none
Software					
Bundled software	none	none	HDT Lite	none	none
Formatter	Relax Installer 1.2	Condor Driver 3.55	HDT Primer Lite 1.1	RMOS Formatter 1.0	Tass Commander 2.1.7
Partitioning	○	●	●	●	●
Backup	○	○	●	○	○
Password protection	●	○	●	○	○
Data encryption	○	○	○	○	○
File recovery	○	○	○	○	○
Disk optimization	○	●	●	○	○
FCC Class B certification	●	●	●	●	○
Company	Relax Technology 3101 Whipple Rd. Union City, CA 94587 510-471-6112 510-471-6267 (fax)	Rodime Systems, Inc. 3251 S.W. 13th Dr. Deerfield Beach, FL 33442 305-480-9581 305-480-9295 (fax)	Saturae Corp. 148 Richdale Ave. Cambridge, MA 02140 800-373-3063 617-661-8166 617-661-8662 (fax)	Sony Corp. 655 River Oaks Pkwy. San Jose, CA 95134 800-352-7669 408-432-0190	Tass Optical World, Inc. 6730 Mesa Ridge Rd. Bldg. B San Diego, CA 92121 619-558-8882 619-558-8883 (fax)

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Our 11x17 printer is guaranteed to make you smile, too.



★★★★
— MACWORLD MAGAZINE
September 1992

Jeanne is thrilled that she doesn't have to fiddle around and tape pages together anymore. No more tiling! No more cut-and-taped mockups!

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CIRCLE 96 ON READER SERVICE CARD.

"...be forewarned: PostScript-clone printers still have a long way to go before they can rival true Adobe PostScript printers."

Quote from MACUSER September 1992 issue. "Personal PostScript Printers" by Bruce Fraser.

For more information, call:

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3.5-Inch Magneto-Optical Drives

Table 3: Features of 3.5-Inch Magneto-Optical Drives, continued

● = yes ○ = no	Third Wave Optical 128P ★★★½	Tulin A-Hive Jr. MO ★★★½
List price	$1,199	$1,199*
Street price	$1,199 (direct)	$1,199 (direct)*
Additional-cartridge price	$39	$49
Pros	Ships with System 7.0.1.	Portable.
Cons	SCSI-ID switch poorly positioned. No FCC Class B certification.	Tech support answered our question incorrectly. Plastic case has no EMI shielding. No FCC Class B certification.
Hardware		
Formatted capacity	119.4 MB	119.4 MB
Internal mechanism	Matsushita LF-3000	Ricoh LF-3000
SCSI-ID selector	dial	push wheel
SCSI termination	external	external
Size (L x W x H)	9 x 6 x 2.5 in.	7 x 7 x 2 in.
Case material	metal	plastic
Fuse	internal	internal
AC outlets	none	none
Software		
Bundled software	HDT PE	none
Formatter	HDT Primer PE 1.1.2	Spot On 2.1.1
Partitioning	●	●
Backup	○	○
Password protection	●	●
Data encryption	●	○
File recovery	○	○
Disk optimization	○	○
FCC Class B certification	○	○
Company	Third Wave Computing, Inc. 1826-B Kramer Ln. Austin, TX 78758 800-880-0440 512-832-8282 512-832-1533 (fax)	Tulin Technology, Inc. 2156H O'Toole Ave. San Jose, CA 95131 408-432-9057 408-943-0782 (fax)

Exceptional features are circled in red.

*Cartridge not included.

Table 3 Criteria

List price — The manufacturer's suggested retail price, including one cartridge unless noted otherwise.

Street price — An average actual price charged by dealers around the U.S. in November 1992.

Additional-cartridge price — How much each additional magneto-optical cartridge costs if the drive includes a cartridge already.

Formatted capacity — The amount of usable storage space available on a single cartridge after formatting, in megabytes.

Internal mechanism — The OEM mechanism used in the drive. These are subject to change, so double-check with the vendor to make sure it is still using the mechanism you want.

SCSI-ID selector — The method used to change the SCSI-ID number.

SCSI termination — The location of the SCSI termination the drive uses.

Case material — The primary material that is used for the drive's case.

Fuse — The location of the fuse.

AC outlets — How many AC power outlets the device has, if any.

Bundled software — Commercial applications, utilities, and shareware that come with the drive.

Formatter — Software for formatting the drive for use with a Mac.

Partitioning — Does the drive come with software that lets you partition a disc into separate volumes?

Backup — Does the drive come with software that lets you copy files to other media for safekeeping?

Password protection — Does the drive come with software that prevents others from accessing data unless they have a password?

Data encryption — Does the drive come with a method of scrambling disc contents to prevent others from accessing data unless they have the correct password?

File recovery — Does the drive come with a utility for rescuing deleted or damaged files?

Disk optimization — Does the drive come with a utility for reorganizing its contents into contiguous blocks to improve performance?

FCC Class B certification — Was the vendor able to provide a verifiable FCC Grant of Certification?

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John Knoll

"The PMO-650 is the ideal storage device for large images."
Thomas Knoll



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CIRCLE 73 ON READER SERVICE CARD.

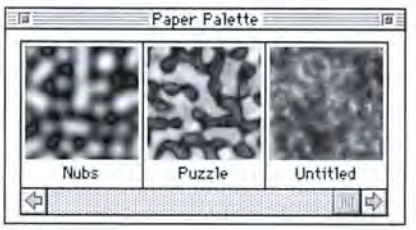
DESKTOP PUBLISHING

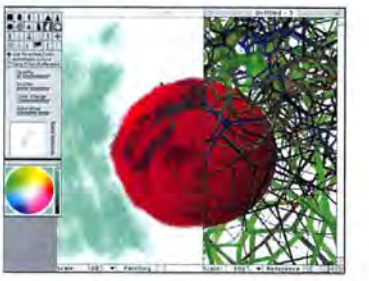
Red-ribbon day: When it comes to promoting AIDS awareness, the Mac industry has been pretty quiet. However, several companies recently banded together to produce Red Hot & Publish, a $49 software collection created to raise public awareness and money to **fight AIDS.**



The collection includes three QuarkXPress Xtensions — Quark Presents, from Quark; PictureInfo, from CompuSense/XChange; and SepsChange, from Vision's Edge/XChange — and six Kai's Power Tools Photoshop plug-ins from HSC Software. The package also entitles buyers to a 20-percent discount on any SuperMac peripheral (except Digital Film). All proceeds go to AIDS research and education. C'mon: Get involved. 800-788-7835 or 303-229-0620.

Media mania: Just when you thought Fractal Design's natural-media painting program couldn't get any cooler, along comes Painter 2.0. Included among its many new features are glass distortion, a cubist brush, multiple lighting sources, marbleized effects, image preview, tear-off palettes, a magic wand, record-and-playback sessions, user-created brushes, and **scads of hot new textures** and effects. Painter 2.0 also borrows some image-editing features from its cousin ColorStudio, so you can export images as color separations and scan in images via a plug-in module. Yowza. 408-688-8800. $399. ▲ You'd expect to get some **impressionistic effects** from something called Monet, but this 24-bit painting program employs object-oriented technology (it records executed strokes rather than individual pixels) to produce faster painting and smaller files that look good on-screen at any size. Version 2.0 from Delta Tao Software also adds resolution-independent output and the ability to paint images from scratch (without a reference image). 408-730-9336. $399.





Nary a drawback: Leave it to the folks at Expert Software to come up with a drawing program that includes such essential features as 24-bit color; text on a path; color blends across objects; gradient fills; and Align, Snap To, and other such exact-placement tools — all for **a cheeky $49.95.** Users of Expert's other programs will recognize Expert Draw's customizable drag-and-drop libraries and unique grab-attributes tool, flexible scaling and rotation tools, and bonus clip-art disk. 800-759-2562 or 305-443-0786. ▲ New to the U.S. but not to the illustration game is ArtBeat Professional, from Practical Pie Solutions. This $249 illustration program boasts 255 drawing/painting layers as well as the capability to **blend objects on a path,** to convert polygons to Béziers, and to bind text to an irregular path. What this program lacks in polish (its European origins are obvious in the manual) it makes up for in power. 201-902-9500.



By Pamela Pfiffner

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Using simple menus and icons, Norton Utilities 2.0 combines the technologies from SUM and Norton Utilities to guide you through the best and worst of computing times.



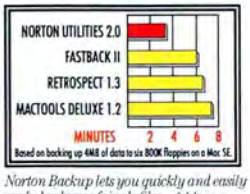
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The CD Stock Market



Strapped for a photo? CD-ROM packages offer a wide variety of stock photography for just about every need.

By Aileen Abernathy

You're designing the annual report for your company and need some photographs of important-looking executives. You also want a picture of money to illustrate last year's profits (or lack thereof), a nature shot to emphasize the company's commitment to the environment, and a picture of the planet Earth to highlight the company's global reach. Finally, you need a classy textured background for the cover.

You could hire a photographer to take the appropriate shots (the Earth photo might be problematic), but that's beyond your budget. Or you could rifle through the catalogs of stock-photo agencies and order transparencies — less expensive but time-consuming: Once you've gotten the images, you still must have them manually stripped into the layout or converted into digital format for electronic placement.

If you have a CD-ROM drive, however, you can save time and money by selecting images from a commercial collection of digital photographs. Just as with clip-art packages, a photography CD-ROM places dozens, even hundreds, of ready-to-use images at your fingertips. Someone else has already done the legwork of choosing and shooting the subjects, developing the film, scanning in the transparencies, and cleaning up the scanned images. You just select an image, edit it as you see fit, and place it in a page layout. The photograph can be color-separated along with the rest of the page, eliminating stripping costs.

ILLUSTRATION: MARK W. SWEENEY

The cost of a photography CD-ROM is usually far less than that of producing the images yourself, and in most cases, digital photographs are royalty-free. That is, you may use the images however and wherever you want without paying additional fees.

With all these advantages, it's no surprise that the market for digital media is booming, helped along by more-powerful computers and the growing popularity of CD-ROM drives. CD-ROMs are relatively inexpensive to produce, so almost anyone can join the fun. As a result, photography CD-ROMs vary wildly in their subject matter, quality, cost, and ease of use. A few collections look as if someone had scanned in the family vacation snapshots and pressed a CD-ROM. Other packages sport well-chosen photographs taken by professional photographers or supplied by stock-photo agencies, along with helpful manuals and on-line search engines.

To help you separate the wheat from the chaff, we looked at nearly 40 discs from a score of companies. Here's what you can expect from the current crop of photography CD-ROMs, plus reviews of our 10 favorites.

Marriage of Convenience

Photography CD-ROMs marry the concept of stock photography with the convenience of digital delivery. A typical CD-ROM package contains 100 color images — amounting to hundreds of megabytes of data — saved in 8- and 24-bit



Figure 1: Most digital photography is in color, but if you print in monochrome mode, you can easily convert images to gray-scale, using a program such as Adobe Photoshop. If the king of the jungle (from Gazelle Technologies' African Wildlife CD-ROM) looks a little fuzzy, use Photoshop's Sharpen filter.





Figure 2: Nature is a favorite subject for photography CD-ROMs. Check out the scenic vistas on Nature's Way, from Gazelle Technologies (top), or the more detailed views on Leaves and Things, from TechScan Computer Imaging (note copyright notice in lower right corner).

PICT and/or TIFF format. These digital photographs are more flexible than their film-based counterparts. A single image can be used in a variety of formats and resolutions or be archived for long periods without any change in appearance. Thanks to the CD-ROM format, it's immune to rough handling and coffee spills.

Digital photographs are easy to edit, too, saving you the expense of fancy darkroom maneuvers. Using a program such as Adobe Photoshop, you can alter color values, crop out unwanted elements, combine images from various photos, apply filters, or merge CD-ROM images with your own artwork. If your output is black-and-white, you can easily convert the images to gray-scale format (see Figure 1), and a few companies include gray-scale images on their discs. In the market for an image-editing program? Several CD-ROMs come with demonstration versions of programs such as Adobe Photoshop and Cachet, the color-correction program from Electronics for Imaging.

Photography CD-ROMs are clearly boons to those who often can't afford professional photographers or the usage fees charged by stock-photo agencies. A stock-photo agency may charge $300 for the one-time use of a single photo in a small publication. You must then spend another $100 to $200 having the transparency separated and stripped into your page layout. In comparison, a CD-ROM of scanned photographs costs around $1 per image. The least expensive collections — the Media Clips series, from Aris Entertainment — are about 40 cents an image.

The usefulness of digital photography isn't limited to the printed page, however. You can incorporate digital photos in on-screen and video presentations, convert them to slides for business meetings, or wrap them around objects in 3-D renderings. In fact, some major users of photography CD-ROMs are multimedia producers, corporate communicators, and educators. (Some CD-ROMs, such as those in the Media Clips series, include sound clips and QuickTime movies along with photographs.)

Photography discs may be relatively inexpensive, but using them requires serious hardware. Obviously, you need a CD-ROM drive. If you don't have one yet, it's a good investment. Many drives now cost less than $600; multisession drives, which you'll want if you use Eastman Kodak's Photo CD, cost a bit more (see "Passport to the Future: CD-ROM Drives," March '93, page 124). You also need at least a Mac II and an 8-bit-color monitor (24-bit color is preferable), plus plenty of disk space and memory. Digitized photos are on 640-megabyte CD-ROM discs for a reason: They are major space hogs. Professional-quality color images can balloon to more than 10 megabytes each. If you want to edit the images, you need multimegabytes of free space on your hard disk and 8 megabytes of RAM (more is better for working with high-resolution images).

Penguins and Paper Clips

Considering the number of photography CD-ROMs, we expected to see a wide variety of subject matter on the discs. Instead, we found that most discs are focused on one of two areas: backgrounds and textures, or nature and the environment.

The photographs on the backgrounds discs are perfect for book and report covers, packaging, and setting the stage for text or other graphics. Images include marble, metal, fabrics, wood, water, coins, leaves — even paper clips and jelly beans. Standouts are the high-resolution, full-page backgrounds from Artbeats, D'pix, and PhotoDisc (see Table 1). CD Folios also has a neat package, Sky: Volume 1, which contains 100 images of sunrises, sunsets, and clouds — perfect backdrops for that next car ad.

Scenic vistas, deserts, flowers, leaves, rivers, penguin parades, and marine life galore — you'll find it all on these environmentally focused CDs. The problem won't be finding the nature image for your annual report; it'll be deciding which one to use. Our favorites (see Figure 2) were the nature close-ups on Leaves and Things (TechScan Computer Imaging) and the animals and landscapes on African Wildlife, Aquatic Art, and Nature's Way (all from Gazelle Technologies).

Outer space is another popular frontier for photography CD-ROMs, and several CD-ROMs contain an image of Earth suitable for your annual report. Two discs — World View, from Aris Entertainment, and The Right Images, from Tsunami Press — contain photographs from NASA's files, including the space shuttle, moon walks, and the solar system as seen by *Voyager*. World View is a budget disc that includes New Age music and QuickTime movies of shuttle launches

and lunar landings, but we prefer the cosmic voyages on The Right Images (see Figure 3).

Only four of the companies whose products we reviewed offer discs with business themes, and only three have people-oriented discs. Fortunately, the people-oriented discs all include important-looking executives as well as families, athletes, and wide-eyed babies. Unfortunately, cultural diversity has not yet reached stock photography; Caucasians dominate most collections, although African Americans are well represented on PhotoDisc's platters.

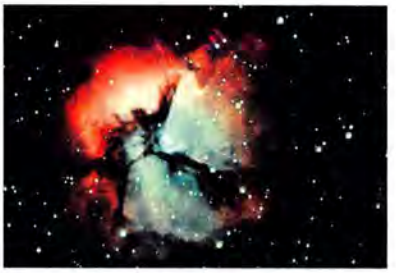


Figure 3: Need a picture of the Trifid nebula? You'll find it, along with 100 other NASA-supplied photos of space travel and astronomy, on The Right Images, from Tsunami Press. Alas, the contents aren't identified, so keep an astronomy buff handy.



Figure 4: Not a vacation shot. Comstock Desktop Photography: CD-ROM Volume III contains carefully composed, perfectly exposed images — just what you'd expect from the foremost stock-photo agency. The CD-ROM contains only 72-dpi images, however; you pay an additional fee to obtain usage rights and high-resolution transparencies.

If you insist on the image quality, variety, and service supplied by a stock-photo agency, you'll like Comstock Desktop Photography: CD-ROM Volume III. The images are carefully posed and perfectly exposed — just the sort used by advertising agencies the world over (see Figure 4). A top supplier of traditional stock photos, Comstock provides low-resolution versions of 441 popular images (from a library of 3 million) on the CD-ROM. The photographs are intended as rough art to be used in designing your piece, replacing the time-consuming and costly system of ordering approval (or *comp*) versions of images at $150 a pop. Thus, using just one image from the CD-ROM amply repays its $99 cost. Once you've reached the production stage, however, you still must order counterpart high-resolution transparencies from the company and arrange for reproduction rights.

For wide variety at a reasonable price, the PhotoDisc series is your best bet. The images are handsome and well composed, and the subject matter runs the gamut from mountaintops to test tubes to piggy banks. (OK, so there aren't any movie stars.) It's one of the few collections to offer a variety of business images (see Figure 5), and the models in its People and Lifestyles collection look more natural than those on Gazelle's two People discs. Four packages were shipping at press time, with ten more scheduled for release sometime this year. A MultiMedia Sampler CD ($49) lets you try out low-resolution versions of 1,100 images from all the discs.

If you're doing presentations, also look at the collections from Gazelle Technologies, which publishes more than a dozen photography CD-ROMs by various photographers. (Gazelle Technologies is the parent company of Educorp, which distributes most of the CD-ROMs in this article.)

Whose Rights?

If you're about to plunk down $100 or so for a disc of stock photos, you're probably wondering: Will I own these images? Negatory. As with other software, buying a photography CD-ROM merely gives you a license to *use* the images in specified ways. The photographer still owns them. The permitted uses vary, but all packages have two absolute no-nos: You can't resell the images, even if they've been edited, and you can't give them away or post them on on-line services or electronic bulletin boards. Flouting the assigned rights violates the U.S. Copyright Act of 1976, and you can be sued.

Most companies represented here grant you unlimited reproduction rights. This means you can use the images as often as you want for projects ranging



Figure 5: PhotoDisc offers a wide variety of well-chosen images at a reasonable price. Its Business and Industry collection includes harried executives; industrial landscapes; traffic jams; and cold, hard cash.





Figure 6: Finding photos on a CD-ROM may resemble playing hide-and-seek. A HyperCard stack (top), here from Aris Entertainment's Wild Places disc, shows just one image at a time. PhotoDisc shames the competition with LightBox (bottom), a slick image database that displays the CD-ROM's entire contents on-screen as slides.

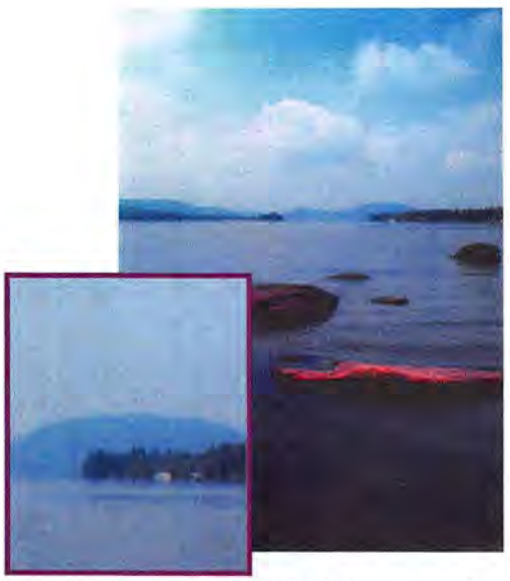


Figure 7: Although nicely composed, the photographs on CD-ROM Galleries' Scenic and Nature III disc are ruined by poor quality control. At a small size, this picture of Speculator Lake looks fine. But enlarge it to full size (inset), and the dismal image quality — visible dirt and scan lines — is readily apparent.

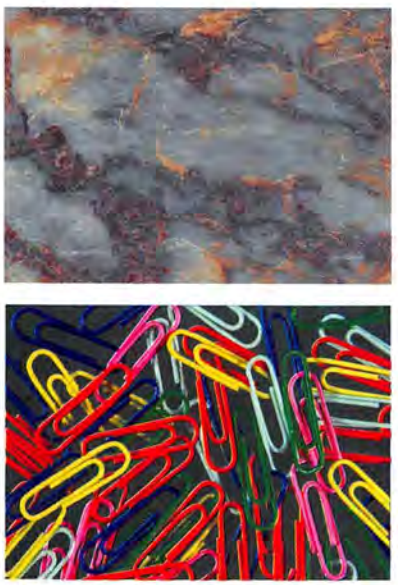


Figure 8: For those who require full-page, high-resolution backgrounds, the CD-ROMs of choice are Marble & Granite (Artbeats, top) and Folio 1 Print Pro CD (D'pix, bottom). The 20-megabyte+ images range from understated photographs of fabric and pale granite to the bold patterns of ambrosia (marble) and paper clips.

from newsletters to national advertising campaigns, and you can edit them to meet your needs. If the photos include images of people, the company has almost certainly already obtained the necessary model releases (it's wise to check, though, just in case).

There are a few twists, however. No company allows you to sell a product, such as a poster or book, that's based on its images. The license on some discs from Aris Entertainment and Gazelle Technologies requires you to run a copyright notice and photo credit with each image. Images on Gazelle's African Wildlife and travel discs can be used only at sizes smaller than one-fourth of a page and distributions of fewer than 10,000 copies. Gazelle also prohibits the use of its images in conjunction with sexually explicit material.

Not surprisingly, Comstock takes a significantly different approach to image copyrights. True to its stock-photo roots, Comstock allows you to use the photographs on its CD-ROM only for in-house projects such as rough layouts, staff presentations, and employee handbooks. If you want to use the images — either those on the CD-ROM or their counterpart high-resolution transparencies — for external or commercial purposes, you must arrange reproduction rights and pay a royalty. The fee can range from $200 to $4,000, depending on how the image is used; but volume discounts are available.

Hide and Seek

A CD chock-full of photographs can be a marvelous resource, but if you can't easily locate and use the images, its value deteriorates. Companies are quick to tout the quality and scope of their collections, but they don't always provide you with a straightforward way of surveying their domains.

As might be expected, the purveyors of high-end collections pay the most attention to customer support. Artbeats, Comstock, D'pix, and PhotoDisc each provide excellent printed materials, including full-color image guides and documentation that includes usage tips.

PhotoDisc definitely walks away the winner, though, thanks to LightBox, its stellar image database. LightBox can display a screen full of slide-sized photographs, search for photos that meet specific criteria, and retrieve the stored images for closer inspection (see Figure 6). CD-ROM Galleries uses Mariah, a similar (though less robust) image database from Symmetry Software. None of the other packages provides full-fledged electronic catalogs, but you can easily create one by using a stand-alone image database, such as Aldus Fetch or Nikon's ImageAccess, that enables you to catalog graphics — from 24-bit photographs to QuickTime movies — and quickly retrieve them by searching for filenames, formats, keywords, and other attributes.

Unfortunately, some of the midrange-CD-ROM developers seem to have missed the Apple spiel on user-friendliness. Documentation? Image guides? The worst offender is TechScan, which provides no guide — paper *or* electronic — for its MaxImages CD-ROMs. Zip. Nada. If you want to see a disc's contents, you must open the photographs in a program such as Photoshop. And be forewarned: Opening large images one at a time from a CD-ROM is *very* tiresome. By the time you get to the 31st image, you've forgotten what the first 10 looked like.

Other developers supply rudimentary on-line references such as HyperCard stacks, which at least display color previews, albeit one at a time. Aris Entertainment has a nice HyperCard implementation, including a "nubby" button that, when pressed, pops up teeny thumbnail views of the entire collection. Clicking on any thumbnail brings the main image to the desktop.

A final frustration is filenames. Some developers use numbers, which isn't a big problem if you can quickly ascertain a file's contents in an image database or if esoteric landmarks are identified somehow, somewhere. But it's a major headache in the case of specialized discs such as The Right Images. Tsunami Press doesn't provide any printed or on-line information about the photographs, so unless you're an astronomy buff, you'll be lost in space.

Quality Control

To some extent, rating the quality of photography CD-ROMs depends on your needs. All of these packages have images suitable for presentation-quality work at 72 dpi (dots per inch). At higher resolutions and large image sizes, however, the warts are glaringly apparent. Many photographs on the Scenic discs from CD-ROM Galleries, for example, are seriously compromised by dust freckles and scan lines (see Figure 7) as well

as by poorly balanced color and contrast.

Another major consideration is the resolution itself. If you're producing publications that will be printed on laser printers, desktop color printers, and other low- to medium-resolution devices, budget-priced CD-ROMs are fine choices. The photos typically have resolutions of 72 dpi and image sizes of 7 x 10 inches (or larger), so they're also well suited to on-screen and video presentations. The packages from Aris, Gazelle, and TechScan all offer a good selection of photographs and reasonable image quality, and they print (and display) just fine. You don't need to spend money on the Cadillac collections, because the expensive images won't look any sharper than the cheap ones at low resolutions.

This scenario changes dramatically, however, if you need photographs for high-resolution output — say, a magazine or a brochure that's printed at 133 lpi (lines per inch). A 7-x-10-inch image that looked great at 72 dpi on a color copier looks ragged when printed on a high-resolution imagesetter. To get an acceptable image at 133 lpi, you must bump the photograph's resolution up to 266 dpi. (Image resolution should be twice the frequency of the line screen.)

Once you've adjusted the resolution, that 7-x-10-inch image contracts to a minuscule 2 x 3 inches. Other images fare slightly better, making them suitable for spot illustrations, but you're in big trouble if the cover of your annual report requires a full-bleed photo. This size problem does not hinder some companies from touting their 72-dpi collections as "high resolution." Just don't be fooled — the images are high-resolution only at midget dimensions. Of course, you can get both high resolution and a large image size by resampling a photograph, but this approach adds new data to the image and makes it look blurry.

If you want to avoid (or are trying to locate) mass-market photography CD-ROMs, watch for image sizes that are expressed in pixel dimensions (640 x 480 pixels instead of 9 x 7 inches), the PICT file format (favored for on-screen presentations), file sizes of less than 5 megabytes, and 72-dpi resolution.

Top of the Mark

At this writing, only a handful of companies — Artbeats, CD Folios, D'pix, and PhotoDisc — are producing digital photographs of sufficient quality for the high-end publishing market. All four companies offer images that are roughly 7 x 11 inches at 266 dpi, and they've sweated the details of scanning, color correction, and image selection.

Simply put, Marble & Granite (Artbeats) and Folio 1 Print Pro CD (D'pix) are the crème de la crème of photography CD-ROMs. If you need production-quality images, you must have these beautifully rendered photographic backgrounds (see Figure 8). Both companies are perfectionist: Unable to trust the JPEG lossy-compression scheme, they use DiskDoubler to ensure that not a single byte is lost. (Uncompressed, the high-resolution files swell to more than 20 megabytes apiece!) In case you think the D'pix CD-ROM is a bit pricey (it is), the company also offers the 100 images at medium resolution for $300 or 10 at medium resolution for $40.

PhotoDisc is hard on D'Pix's heels, however, offering a greater variety of images, steadily improving image quality, and a superb image database. PhotoDisc is the only company that color-corrects its images with the highly touted Cachet, and Adobe gave PhotoDisc images the seal of approval by selecting them for inclusion on the Photoshop 2.5 Deluxe CD-ROM.

With all these advantages, it's unfortunate that PhotoDisc missed a few beats on quality control. Its first volume, Business and Industry, has photos that have been scanned backwards, inconsistent filenames, and some images that show dirt and scan lines. The company instituted more-stringent quality checks for subsequent volumes; even so, the fourth package — Science, Technology and Medicine — has a few dusty photos and at least one photo, an orbital view of Earth, is backwards.

Custom CD-ROMs

Another CD-ROM stock option that's gaining currency is the idea of custom discs. For example, in your quest for photographs for that annual report, you might want to feature the company's employees rather than anonymous models. Yet you'd like to retain the convenience and permanence of a photography CD-ROM. That's where Eastman Kodak's Photo CD comes in.

You take photographs of key executives. Then when you drop off your 35mm film for processing, you get back prints plus a CD-ROM with each photograph stored in several resolutions, including a high-resolution compressed version for photographic-quality work. The cost? About $20 for 24 exposures. To locate the Photo CD-capable photo finisher nearest you, call 800-242-2424.



Figure 9: Fearless Color's Ready-Seps Volume 1: San Francisco offers the famous skyline of Alamo Square, along with other San Francisco sites, in preseparated CMYK EPS format.

Like their paper predecessors, however, Photo CD discs are mass-produced, which means that individual photos won't get careful critiques. If quality control is a priority, check out Ready-Seps, the custom CD-ROM service offered by Fearless Color, a San Francisco color shop (415-431-9020).

Fearless Color takes your transparencies or flat art, scans it on a high-resolution drum scanner, color-separates the images, and makes proofs. Then, instead of producing film of your approved, final images, the shop masters a CD-ROM that stores them, *preseparated*, in CMYK EPS or DCS format. As a bonus, Fearless Color can index the CD-ROM to meet your needs, including thumbnails and keywords. Images produced by Ready-Seps cost $20 to $50 each, depending on the quality level required. For a commercial showcase of the Fearless Color technique, check out Ready-Seps Volume 1: San Francisco ($249), which contains 20 images of the City by the Bay saved in CMYK EPS format (see Figure 9). Each 8-x-10-inch photograph is stored in two resolutions: as a 22-megabyte file optimized for 133 lpi and in a 5-megabyte version for output to 300-dpi color printers.

Aileen Abernathy, a former *MacUser* editor, is busy putting all her vacation photos on CD-ROM.

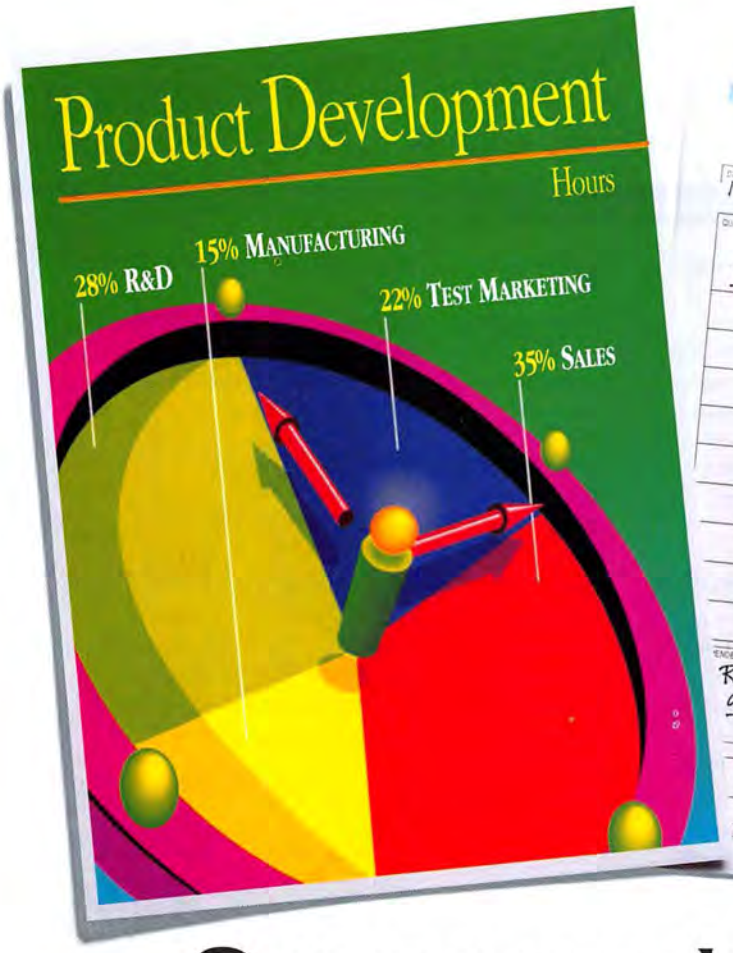
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Table 1: Features of Photography CD-ROMs

	Aris Entertainment	Artbeats	CD Folios	CD-ROM Galleries	Comstock
	Media Clips series: Business Backgrounds; Jets & Props; Money, Money, Money; Wild Places; World View	Marble & Granite	Sky: Volume 1	Scenic and Nature III; Scenic and Architecture	Comstock Desktop Photography: CD-ROM Volume III
	ŧŧŧ½	ŧŧŧŧŧ	ŧŧŧŧ½	ŧŧ½	ŧŧŧŧŧ
List price*	$39.95 – $59.95	$349 (2 discs)	$169.95	$69.95 each	$99
Pros	Good-looking photos for presentations. Some discs include sound clips and QuickTime movies. High-resolution images available for additional fee. Inexpensive.	Classy full-page, high-resolution images. Great manual. Includes 120 multimedia backgrounds and 160 seamless tiles.	Excellent full-page, high-resolution images. Scanned at 2,000 dpi. Self-decompressing JPEG files.	Good selection of nature images for presentations. Nice on-line catalog. Inexpensive.	From major stock-photo agency. Nice variety of subjects. Excellent image quality and manual. Floppy-disk version and on-line service available.
Cons	Tiny images at high resolution. Minimal documentation.	None, really, although files are large.	Buggy decompression utility. Minimal documentation.	Uneven color, brightness, and contrast quality. Extremely dirty images at high resolution; some scan lines.	Severe restrictions on usage. Only low-resolution versions supplied; additional fee for high-resolution transparencies.
Images per volume	100 – 200	40	100	100	441
Color file formats	8- and 24-bit PICT	8- and 24-bit TIFF	8- and 24-bit PICT and JPEG	24-bit TIFF and PICT	24-bit TIFF
Gray-scale file formats	NA	1-bit TIFF	NA	NA	8-bit TIFF
Default resolutions	72 dpi	270 dpi	72 and 2,000 dpi	72, 300, 1,200 dpi	72 dpi
Image size, 72 dpi	6.7 x 8.9 in.	20 x 24 in.	6.7 x 10.5 in.	3 x 4 – 15 x 24 in.	5 x 7 in.
Image size, 266 dpi	1.8 x 2.4 in.	8.7 x 11.2 in.	7.2 x 10.7 in.	4 x 6 – 11 x 16 in.	1.3 x 2 in.
File size (at highest res.)	900K	21 MB	15 MB	6 MB	550K
Compression	no	yes (lossless)	yes (JPEG)	no	no
Image catalog	HyperCard stack	printed guide	printed sheet	Mariah database	printed guide
Copyright restrictions†	credits required	none	none with registration	none	in-house use only
Software demos	HyperCard	none	ImpressIt	Mariah	Photoshop
Company	Aris Entertainment 4444 Via Marina Ste. 811 Marina Del Rey, CA 90292 800-228-2747 310-821-0234 310-821-6463 (fax)	Artbeats P.O. Box 1287 Myrtle Creek, OR 97457 800-444-9392 503-863-4429 503-863-4547 (fax)	CD Folios 6754 Eton Ave. Canoga Park, CA 91303 800-688-3686 818-887-2003 818-887-6950 (fax)	CD-ROM Galleries 512 Gertrude Ave. Aptos, CA 95003 408-685-2315 408-685-0340 (fax)	Comstock The Comstock Bldg. 30 Irving Pl. New York, NY 10003 800-225-2727 212-353-8600 212-353-3383 (fax)

*Most CD-ROMs mentioned in this article are available at discounted prices from Educorp (800-843-9497 or 619-536-9999).

†No company allows images to be resold commercially or given away.





Our new color printer not only looks great on paper, it looks great on paper.

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CIRCLE 38 ON READER SERVICE CARD.

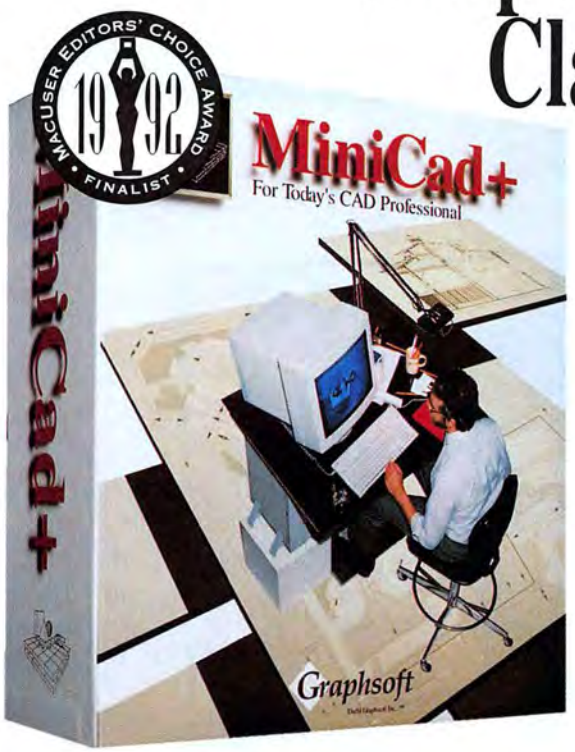
Table 1: Features of Photography CD-ROMs, continued

	D'pix	Gazelle Technologies	PhotoDisc	TechScan Computer Imaging	Tsunami Press
	Folio 1 Print Pro CD	African Wildlife; Aquatic Art; Nature's Way; Ocean Imagery; People in Business; People at Leisure; USA Travel; World Travel I: Europe	PhotoDisc series: Business and Industry; People and Lifestyles; Backgrounds and Textures; Science, Technology and Medicine	MaxImages series: Backgrounds and Elements; Leaves and Things	The Right Images
	$4\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	3	4
List price*	$499.95 (3 discs)	$69.95 – $129.95	$299 – $395	$99.95 – $189.95	$249.95
Pros	Superb full-page, high-resolution backgrounds. Good manual. Free CD-ROM caddy and T-shirt.	Quality varies, but good overall. Nature and travel discs particularly eye-catching. Good presentation choices.	Variety of well-chosen subjects. Good composition and color quality. Superb on-line catalog and printed manual.	Many nice nature images for presentations. Thumbnail files are freely distributable.	Excellent photos of space travel and cosmos. Colorized images supplied by NASA.
Cons	Expensive. High-resolution images awkward to access.	Small images at high resolution. No printed materials. Some dirty images on Ocean Imagery and People discs. People look artificial.	Some problems with dirt, scan lines, and reversed images, particularly in Business and Industry.	Tiny images at high resolution. Some images are poorly scanned, washed out, or streaky. No printed or on-line previews.	Small images at high resolution. nanoBrowser of limited usefulness. Images not identified. Expensive.
Images per volume	100	100 – 240	100 – 400	45 – 86	103
Color file formats	24-bit TIFF	8- and 24-bit PICT and TIFF	24-bit TIFF, PICT, JPEG	8- and 24-bit TIFF	8- and 24-bit PICT
Gray-scale file formats	NA	8-bit PICT	NA	8-bit TIFF	8-bit PICT
Default resolutions	75 and 266 dpi	72 – 120 dpi	72 dpi	72 dpi	72 dpi
Image size, 72 dpi	9 x 12 in.	7.5 x 11 – 9.8 x 14.6 in.	19 x 29 – 27 x 41 in.	10.8 x 15.8 in.	12 x 14 in.
Image size, 266 dpi	9 x 12 in.	3 x 4 in.	5 x 8 – 7 x 11 in.	2.9 x 4.3 in.	3 x 4 in.
File size (at highest res.)	22 MB	2.2 MB	6 – 15 MB	2.5 MB	2 MB
Compression	yes (lossless)	none	yes (JPEG)	no	no
Image catalog	printed guide	HyperCard stack	printed guide; LightBox database	no	nanoBrowser utility
Copyright restrictions†	none	varies	none	none with registration	none
Software demos	none	Photoshop, HyperCard	Photoshop, Cachet, Gallery Effects	Photoshop	none
Company	D'Pix 414 W. 4th Ave. Columbus, OH 43201 800-238-3749 614-299-7192 614-294-0002 (fax)	Gazelle Technologies 7434 Trade St. San Diego, CA 92121 800-843-9497 619-536-9999 619-536-2345 (fax)	PhotoDisc, Inc. 2013 4th Ave. 2nd Floor Seattle, WA 98121 800-528-3472 206-441-9355 206-441-9379 (fax)	TechScan Computer Imaging P.O. Box 895 Port Hueneme, CA 93044 805-985-4370 805-985-7221 (fax)	Tsunami Press 275 Rte. 18 East Brunswick, NJ 08816 800-448-9815 908-613-0509 908-238-3053 (fax)

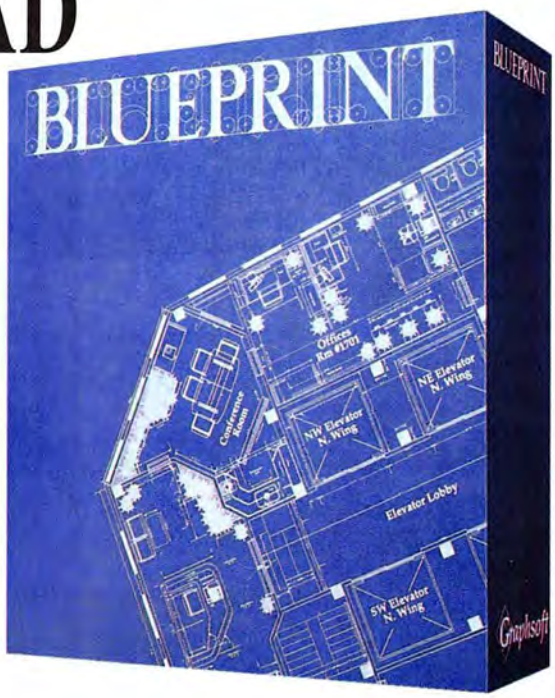
*Most CD-ROMs mentioned in this article are available at discounted prices from Educorp (800-843-9497 or 619-536-9999).

†No company allows images to be resold commercially or given away.

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- ☐ Smart Cursor for locating snaps
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- ☐ editable line styles
- ☐ pan by scroll bars or hand
- ☐ color by object or layer
- ☐ DXF translator - free
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- ☐ global symbol editing
- ☐ on-line prompts
- ☐ unlimited drawing space
- ☐ pick-up and put-down attributes
- ☐ selection by properties
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- ☐ hierarchical symbol library
- ☐ add & subtract surfaces
- ☐ fractional feet and inches option
- ☐ fillets
- ☐ editable fills
- ☐ beziers
- ☐ wall-join
- ☐ chamfers
- ☐ tolerancing
- ☐ unlimited saved views
- ☐ hatching
- ☐ polylines
- ☐ classes
- ☐ export EPSF
- ☐ free Claris CAD translator
- ☐ round wall caps
- ☐ edit inside groups
- ☐ scale by layer

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- ☐ walkthrough and flyover tool
- ☐ create 3D view from floorplan
- ☐ sweeps, extrusions & meshes
- ☐ 3D reshape tool
- ☐ roof & slab tools
- ☐ 3D smart cursor
- ☐ auto sectioning
- ☐ multiple view

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- ☐ search or select by field value
- ☐ create default records
- ☐ auto update reports

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- ☐ perform engineering analysis
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- ☐ automate repetitive tasks

Claris CAD $ 899.00

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- ☐ Graphic Guide for locating snaps
- ☐ advanced auto-dimensioning
- ☐ editable line styles
- ☐ pan by scroll bars
- ☐ color by object only
- ☐ DXF translator - extra charge
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- ☐ fillets
- ☐ editable fills
- ☐ beziers
- ☐ wall-join
- ☐ chamfers
- ☐ tolerancing
- ☐ 9 saved views
- ☐ hatching

3D CAD:

none

Integrated Database/Spreadsheet:

none

Programmability:

none

Blueprint 4 $ 295.00

2D CAD:

- ☐ smart walls
- ☐ Smart Cursor for locating snaps
- ☐ advanced auto-dimensioning
- ☐ editable line styles
- ☐ pan by scroll bars or hand
- ☐ color by object or layer
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- ☐ polylines
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- ☐ auto-insert symbols in walls
- ☐ hierarchical symbol library
- ☐ add & subtract surfaces
- ☐ pick-up and put-down attributes
- ☐ fillets
- ☐ editable fills
- ☐ beziers
- ☐ wall-join
- ☐ chamfers
- ☐ tolerancing
- ☐ unlimited saved views
- ☐ hatching
- ☐ on-line prompts
- ☐ export EPSF
- ☐ scale by layer
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- ☐ round wall caps
- ☐ edit inside groups

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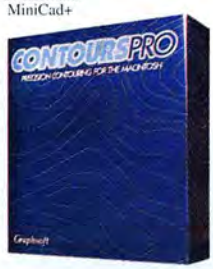
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8XL	479	8	1152 x 870	4		
PaintBoard Li	829	24	1024 x 768	4	■	
24STV	799	24	640 x 480	1	■	Up to 30
MediaTime	1,599	24	640 x 480	1		Up to 30
SUPERMAC						
Spectrum/24 PDQ Plus	$1,549	24	1152 x 870	4	■	
Spectrum/8	419	8	1152 x 870	4		
Spectrum/24 Series III	829	24	1024 x 768	3	■	
Spectrum/8•24 PDQ	829	24	640 x 480	4		
Spectrum/8•24	579	24	640 x 480	4		
Video Spigot	369	24	160 x 120	1		Up to 30
Video Spigot & Sound	749	24	160 x 120	1		Up to 30
RADIUS						
Precision Color 24X	$1,649	24	1152 x 882	4	■	
Precision Color 8XJ	499	8	1152 x 882	4	■	
Precision Color 8X	749	8	1152 x 882	4	■	
Precision Color 24XK	829	24	1024 x 768	3	■	
Precision Color 24XP	499	24	832 x 624	2	■	
Video Vision	1,979	24	640 x 480	4		Up to 30

Monitors shown on this page are listed in the chart at right.

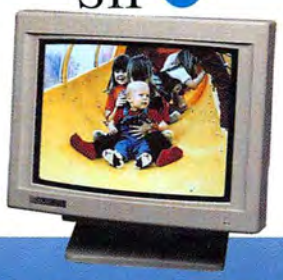
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Monitors: all sizes, types, and prices.

	Price	Tube type	640 x 480	640 x 870	832 x 624	1024 x 768	1152 x 870	Auto-syncing	Anti-glare	Mac on-board compatible
A. Radius 21" Color	$3,069	Hitachi					■		■	
B. RasterOps 21" Color	2,799	Hitachi					■		■	■
C. SuperMac (SuperMatch) 21"	2,529	Hitachi					■		■	
SuperMac 21" Mono/Grayscale	989	—					■		■	
D. RasterOps 20" Trinitron Multi-Mode	$2,329	Trinitron	■		■	■	■	■	■	■
Radius Precision Color 20"	2,389	Trinitron	■		■	■	■	■	■	■
RasterOps 20" Hitachi Color	1,469	Hitachi	■		■	■	■	■	■	■
E. RealTech 20" Trinitron Multi-Mode	1,895	Trinitron	■		■	■	■	■	■	■
F. SuperMac 20" (SuperMatch)	1,499	Hitachi				■			■	
G. SuperMac 20" (SuperMatch Dual-Mode)	2,499	Trinitron				■	■		■	
H. NEC 17" 5FG Color	$1,589	Toshiba	■		■	■	■	■	■	
I. RasterOps 16" (RasterOps Sweet 16)	1,249	Panasonic			■				■	
J. RealTech 17" (RealTech Multi-Mode)	995	Hitachi	■		■	■		■	■	■
K. Sony 17"	1,189	Trinitron	■		■	■		■	■	■
L. Seiko Instruments 17" CM1760LR	1,249	Trinitron	■		■	■		■	■	
Radius 15" Precision Color Pivot (at left)	$959	Non-Trinitron	■	■	■	■		■	■	
RealTech 15" Grayscale (shown at left)	449	—		■					■	■
Seiko Instruments 14" Color CM1445 (left)	479	Trinitron	■							■
Sony 13" Color (shown at left)	689	Trinitron	■						■	■

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The photo above is a 300 dpi image of an 8 x 10 transparency. It was scanned on the RealTech Scan 800 with Transparency Option (shown at right), then adjusted with ScanMatch and color-corrected with Adobe Photoshop.

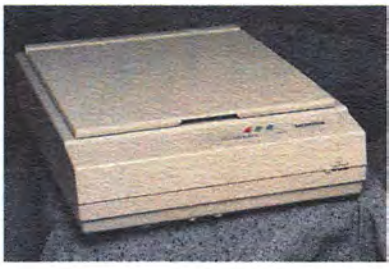
Scanners.

Real Tech™

Real Tech Scan 800 with Transparency Option

Flatbed desktop scanners for 24-bit color, 8-bit grayscale, and black/white images. Ideal for mid-range output or position prints for mockups/presentations.	Price	DPI	Brightness & contrast levels	Scanning area	Flat art	Transparencies	Slides	Software
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Scanmaker II	$909	600	14	8.5 x 13.5	■			*Includes limited version of Adobe Photoshop*
Scanmaker IIXE	1,179	600	14	8.5 x 13.5	■			*Includes full version of Adobe Photoshop*
Scanmaker 1850 Slide Scanner Transparency Option	1,569	1850 (1850)	14 (14)	2.5 square inches			■	*Includes full version of Adobe Photoshop*
REALTECH								
Scan 800 *Optional Adobe Photoshop*	$1,199 200	800	200	8.5 x 11.75	■			*Includes Scan-Match color calibration software*
Scan 800 with Transparency Option	1,695	1200	200	8.5 x 11.75	■	■	■	
UMAX								
UC 630	$1,179	600	51	8.5 x 14	■			*Includes full version of Adobe Photoshop*
Transparency Option	729	(600)	(51)	6 x 9	■	■	■	
UC 840	1,299	800	51	8.5 x 14	■			*Includes full version of Adobe Photoshop*
Transparency Option	729	(800)	(51)	6 x 9	■	■	■	

MICROTEK



Microtek Scanmaker II



Microtek Scanmaker 1850 Slide Scanner



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**All leases are subject to credit approval. All lease payment[illegible]*

Color printers.

SII Seiko Instruments Personal ColorPoint PSE

$2,649 Lease: $73/mo.



Prints full-bleed comps on plain laser paper or transparency film. 300 dpi color thermal printer uses 16 MHz RISC processor. 5 Mb RAM standard, upgradable to 9 or 21 Mb. Adobe PostScript® compatible. Includes AppleTalk, parallel, and RS-232 interfaces, plus an optional SCSI port. Continuously polls all interfaces; reconfigures automatically. 17 resident fonts.



RasterOps CorrectPrint 300i Dye Sublimation Printer with 36 Mb

$8,099 Lease: $222/mo.

Uses a 4-color (CMYK) dye sublimation thermal process at 300 dpi for photographic-quality output. Prints on special sheetfed paper or transparencies, not on rolls. 8.1" x 11" image size on legal paper. Uses a RISC controller, 35 resident fonts, three interfaces, including TCP/IP.

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*PANTONE is Pantone, Inc.'s check-standard trademark for color.



Printing solutions.



Laser printers.

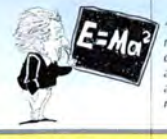
The right printer can do wonders for your productivity. Do you need speed? Adobe PostScript Level 2? Do you need to print a lot of pages each month?

Dpi / Engine speed / RAM	Interpreter / Microprocessor	Duty cycle / Paper trays	SCSI port / Interfaces	Resident fonts / Misc.	*Do you need to print complex graphics on a daily basis or large quantities of high-quality, time-sensitive documents? We can recommend the right printer for your needs.*
NEC Silentwriter Model 95 ★★★★ **$1,469** Lease: $40/month	■ Adobe PostScript Level 2 ■ Motorola 68000 processor	■ 6,000 pages per month ■ Built-in envelope feeder & 250-sheet tray; optional 2nd tray available in letter or legal sizes	■ No SCSI port ■ Appletalk RS-422, parallel, and RS-232C	■ 35 *Micro-fine toner and NEC's patented "Sharp Edge" technology create sharp black print quality*	NEC
RealTech Laser **$1,595** ★★★★½ Lease: $44/month	■ Adobe PostScript Level 2 ■ Weitek RISC processor	■ 5,000 pages per month ■ Optional 2nd paper tray & cassette feeder are available for $250 (for both) *"Genius level" memory is dynamically allocated and automatically reclaimed.*	■ SCSI port ■ Appletalk RS-422, parallel, and RS-232C.	■ 35 *ATM font rendering technology builds raw type characters 4 to 5 times faster, enabling the RealTech Laser to print complex documents faster than other printers in its price range.*	Reprinted from MacUser, Sept. 1992. Copyright ©1992, Ziff Communications Co. ★★★★½ *"The RealTech features not just a genuine Adobe interpreter, but also a PostScript Level 2 raster image processor (RIP), which earns it more than a few points for forward compatibility."* — Publish Magazine, Feb. 1992
Texas Instruments MicroLaser XL Turbo **$2,795** Lease: $77/month	■ Adobe PostScript Level 2 ■ Weitek RISC processor	■ 25,000 pages per month ■ Optional 2nd paper drawer	■ Optional SCSI port ■ Appletalk RS-422, parallel, and RS-232C	■ 35	Texas Instruments
Texas Instruments MicroLaser Plus **$1,249** Lease: $34/month	■ Adobe PostScript Level 1 ■ Motorola 68000 processor	■ 10,000 pages per month ■ Optional 2nd paper drawer and envelope feeder	■ Optional SCSI port ■ Appletalk RS-422, parallel, and RS-232C	■ 17 *Available with 35 resident fonts ($1349)*	
newgen ★★★	■ PostScript compatible ■ Weitek XL-8220 RISC processor	■ 10,000 pages per month ■ Optional 2nd paper drawer	■ SCSI port ■ Appletalk RS-422, parallel, RS-232C	■ 35	**NewGen 660B** **$4,059** Lease: $111/month
The only 11x17 printer with Adobe PostScript Level 2 for less than $3500. **RealTech Laser 400** **$3,195** Lease: $88/mo.	■ Choice of 300 or 400 dpi ■ 15 ppm (letter size); 8 ppm (tabloid size) ■ 4 Mb RAM (expandable to 16 Mb)	■ Adobe PostScript Level 2 ■ Weitek RISC processor (and ATM font rendering technology)	■ 30,000 pages per month ■ Two paper trays included *(one tray for letter size; one tray for tabloid size.)*	■ SCSI port ■ 35 *Three interface ports: Appletalk RS-422, IBM PC parallel, and RS-232C.*	★★★★ MacWorld Magazine September 1992 ***"...be forewarned: PostScript-clone printers still have a long way to go before they can rival true Adobe PostScript printers."*** Quote from MacUser September 1992 issue. "Personal PostScript Printers" by Bruce Fraser.
QMS 860 Hammerhead* **$4,279** Lease: $117/mo.	■ 600 dpi ■ 8 ppm (letter size); 4.6 ppm (tabloid size) ■ 12 Mb RAM (expandable to 32)	■ Adobe PostScript compatible ■ Intel 80960CA RISC processor	■ 10,000 pages per month ■ Optional 2nd paper cassette	■ SCSI port ■ Optional Ethernet ■ 39 fonts	*Three interface ports: Appletalk RS-422, IBM PC parallel, and RS-232C.*

Jeanne is thrilled that she can print proofs of her company newsletter on tabloid-size paper. No more tiling!













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DAYSTAR DIGITAL

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33 MHz Turbo 040	1349
25 MHz FastCache Turbo 040	259
33 MHz FastCache Turbo 040	339

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FUSION DATA

TokaMac Accelerators

High-speed performance for the Mac IIci, IIsi, and LC. The same processor used in the Quadras can increase performance up to 300% for graphics and multi-media programs...or up to 600% when you're number-crunching!

TokaMac IIci	$1409
TokaMac IIsi	1409
TokaMac ELC	1075

NEWER TECHNOLOGY

Quadra 700 Overdrive Accelerator

Increases performance up to 32%.

Quadra 700 Overdrive	$259

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DSP board accelerates Adobe Photoshop filters by 200-964%.

Image Magic NuBus	$769
Image Magic FX/PDS	699
Image Magic Quadra/PDS	699

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Quick SCSI Accelerator

A SCSI-2 NuBus host adapter; improves SCSI performance by up to 500%. Partitioning allows a smaller capacity drive to be mirrored into a partition of a larger capacity drive. *SCSI-1 compatible to work with your existing SCSI devices.*

Quick SCSI Accelerator	$339

RADIUS

Rocket Accelerators

For the Mac II family. The 25 MHz Rocket 25i is powered by a 68LC040 processor. The 25 MHz Rocket and 33 MHz Rocket 33 are powered by a 68040 processor, with integrated math-coprocessor. All include: 8 SIMM slots for up to 128 Mb of DRAM; 040 PDS slot; and QuickDraw and display-list acceleration software.

Radius Rocket 25i	$1239
Radius Rocket 33	2069
SCSI II Booster	249
Rocket Share	419

CARDS AND HUBS



Asanté 10T Hub/8 (Ethernet concentrator)

Lets you use inexpensive unshielded twisted-pair (UTP) telephone wire instead of expensive coaxial cable for local area networks.

10Base-T Hub/8	$265

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MacCon 3 Card	$216

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Connects Mac II computers to thick, thin, fiber optic or 10Base-T Ethernet cable systems. Includes an RJ-45 jack for 10Base-T wiring.

DaynaPORT E/II-T NuBus Card	$149

DaynaPort E/Z. Ideal for Macs that don't have a slot for a network interface card.

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The only gateway that can be upgraded to a file-sharing and UNIX-AppleTalk printer sharing gateway. Two-year warranty.

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Farallon

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EtherMac Cards(Mac II/LC/SE)	219
EtherMac Card (Si and SE/30)	259
Timbuktu 4.02	139
PhoneNet Star Controller (stand-alone hub)	959
(24-port)	1389
PhoneNet Star EN (12-port)	1169
PhoneNet Card (LocalTalk)	219
PhoneNet Connector Din-8 (10)	199
PhoneNet Repeater	369



Shiva

FastPath 5R Router/Gateway	$1669
NetBridge	399
EtherGate Router	1239
NetSerial	269
NetModem/E	1409
NetModem v.32 (for LocalTalk)	989
Hublet	229
LanRover/L	579
LanRover/E (4-port)	1659
TeleBridge	399

If you don't know which networking product will work with your particular setup, give us a call. We can help! Clockwise from bottom: Daria, Jon, Michael, Chuck, James, Ed (a few members of our friendly sales team).



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PowerBook 160 with 8/80 *$2999*
PowerBook 160 with 8/120..... *3359*

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Supra v.32 bis	*369*
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MassMicro FM 24/96 Personal	*165*
Global Village TelePort–*Gold*	*459*
Global Village TelePort–*Silver*	*399*
Global Village TelePort–*Bronze*	*209*

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12 Mb Upgrade	*809*

PowerBook Modems

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Global Village PowerPort–*Silver*	*399*
Global Village PowerPort–*Bronze*	*209*
PSI Integration	*199*
PSI 10/42	*269*
MassMicro FM 24/96 PB	*189*
Solectek Pocket Fax	*229*
Zoom Pocket Modem	*119*

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PERIPHERAL LAND

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Call for information on the latest SCSI 2 technology.

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210 Mb DiamondDrive	809

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Storage: 240 Mb-2 Gb





NEWER TECHNOLOGIES

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PERIPHERAL LAND

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Lease: $77/mo.



Macintosh IIsi Solution *with 5 Mb of RAM, 120 Mb hard drive, Seiko 14" Trinitron monitor, and Key Tronic MacPro Plus extended keyboard.*

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Lease: $47/mo.



Macintosh LC II *with 4 Mb of RAM, 40 Mb hard drive, Sony 13" color monitor, and keyboard.*

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Mac IIsi Solution with RealTech Full-Page Grayscale Monitor
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Macintosh IIci Business Solution
Macintosh IIci with 5 Mb of RAM, 212 Mb hard drive, Real-Tech 21" monochrome monitor, cache card, and Key Tronic MacPro Plus extended keyboard.

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HARDWARE THAT FITS

CIRCLE 199 ON READER SERVICE CARD.

Playing with Clip Art

Manipulate off-the-shelf clip art for custom illustrations.

By Janet Ashford

Need an illustration but can't draw a straight line? If you've got a supply of PostScript clip art, great graphics are as close as your own creativity. By combining, coloring, and altering clip art, you can make custom illustrations even if you don't know a Bézier curve from a bevel.

Some clip-art vendors make it easy for you by designing their products with customization in mind. 3G Graphics, for example, sells complex PostScript illustrations that can be used as a group or pulled apart into separate components, such as the spot illustrations in this music poster. By using a strong, simple palette of eight bright colors and a framework of underlying squares, I was able to unify different styles of clip art from three packages.

Check the manual that comes with your clip-art software. Some manuals, such as those from T/Maker, Dynamic Graphics, and 3G Graphics, include tips for altering their art. You need the manipulation tools available in Deneba's Canvas, Adobe Illustrator, Aldus FreeHand, Fractal Design's ColorStudio with Shapes, and other PostScript illustration programs. Then you can ungroup clip art and crop, rotate, skew, flip, color, distort, combine, resize, and step-and-repeat it. Or you can change its stroke and fill and add patterns, gradations, textures, and type to create new illustrations.
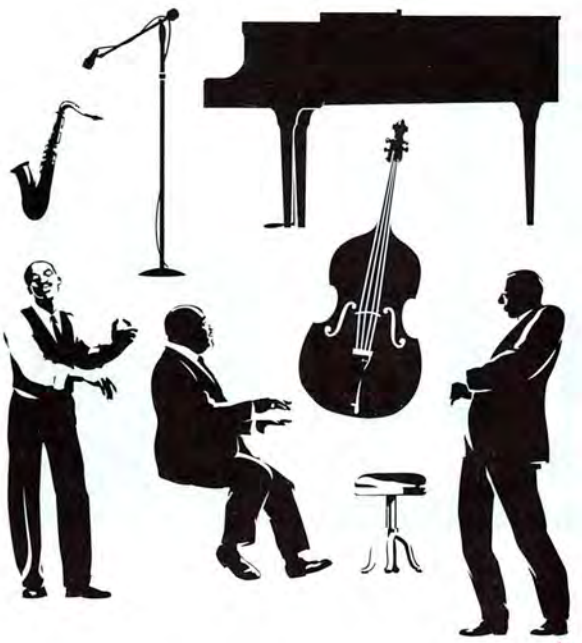
Graphic designer Janet Ashford is a contributing editor to *Step-by-Step Electronic Design.*

To create this colorful poster, I combined elements of four clip-art illustrations from three of 3G Graphics' clip-art packages: Accents and Borders I (the black-and-white music vignettes), Accents and Borders II (the color music vignettes and music script), and People (the jazz trio). Using Aldus FreeHand (you can use any PostScript drawing program), I ungrouped the illustrations so I could select separate components and change their colors to fit the poster's color palette.





a



b

1 Ungrouping Illustrations

I built the poster around the image of a saxophone player, which I took from an illustration of a jazz combo (a). After ungrouping the trio, I further separated the image of the saxophonist (b) so I could respecify its black-and-white parts (body, highlights, saxophone) as purple, yellow, gold, and magenta. I also scaled the figure up and flipped it across the vertical axis.



a



b

2 Building a Background

I used FreeHand's rectangle tool to draw a symmetrical grid of colored squares and used its alignment tools to position the squares (a). To jazz up the title, I assigned a different typeface to each letter: from left, Franklin Gothic, Garamond, Benguiat, Times Italic, and Galliard. Next I added a red, rectangular inner frame and a clip-art music staff (b) to serve as a background for the sax player.



a



b





c

3 Changing Color, Size, and Orientation

Drawing from two sets of music-oriented spot illustrations (a, b), I isolated individual instruments such as the electric guitar, recolored them to suit the poster's palette, resized and rotated them to fit their frames (c), and placed them in the ten squares along the sides of the poster.



a



b

4 Cropping and Flipping

You can modify clip art in a multitude of ways. I created a playing-card design by starting with an illustration from Silicon Designs' Art Nouveau Images (a). I deleted all but the woman's upper body and flower basket, added color, and then copied the figure and flipped it across the horizontal and vertical axes (b).



a



b



c

5 Rotating Around a Reference Point

To create this flying fickle finger of fate, I colored a pointing hand from T/Maker's ClickArt EPS Illustrations (a) in two tones and then copied and rotated it around a central reference point for designs with the finger pointing out (b) and in (c).



a



b

6 Creating a Neon Effect

To make this ClickArt light bulb (a) glow, I selected the bulb and colored it solid blue with no line. Next, I created a copy of the image, colored that copy a lighter shade of blue with a 4-point line, and sent it behind the original. Stacking a series of copies behind the original, each with a thicker line weight and a lighter color, gives the glowing effect (b).



a



b

7 Changing the Stroke and Fill

This illustration of a toucan from Dynamic Graphics' Electronic Clipper (a) looks great in its original black and white. But I quickly created a new look by adding solid-color fills and thick 3-point lines in contrasting colors to all the shapes. A rectangle background completes the new version (b).

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According to *MacUser* magazine, if you want to combine Macs and PC-compatibles onto one network—especially if you want to share files among all platforms—a non-Mac file server is probably the way to go.

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486DX2-66	$3995

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"The smallest, lightest SCSI Ethernet interface available for the Mac."
– MacUser, February 1993

Actual Size.



Actual Price!*

Macintosh SCSI Ethernet Adapter Comparison	DaynaPORT SCSI/Link	Asanté EN/SC	Focus EtherLAN SC
Dimensions	6"x3"x1.75"	8"x4"x1.5"	7.5"x5.5"x1.5"
Weight	13 oz.	24 oz.	25 oz.
Pass through SCSI	Yes	Yes	No
SCSI termination switch	Yes	No	No
3-in-1 models available	Yes	Yes	No
Autosensing Ethernet ports	Yes	No	No
Onboard SCSI controller	Yes	No	Yes
100% Apple SCSI compatible†	Yes	No	No
SCSI cable included	Yes	Yes	No
Warranty	Lifetime	5 years	5 years

† Only SCSI/Link fully implements the IEEE SCSI specifications without modifying the Apple SCSI Manager.
* Actual street prices for our products are typically about 20% to 30% less than retail. Check with your reseller for current prices.

The editors of *MacUser* magazine said it best. DaynaPORT SCSI/Link is the smallest, lightest SCSI Ethernet adapter on the market today.

But don't just try us for size. Compare us feature for feature with our competition and you'll see that we've packed a whole lot of value into a very small product. Add to that our reputation for quality engineering, design and manufacturing, our superb technical support and our no-nonsense lifetime warranty, and you simply won't find a better, safer buy from anyone else in the industry.

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yes It runs with NetWare

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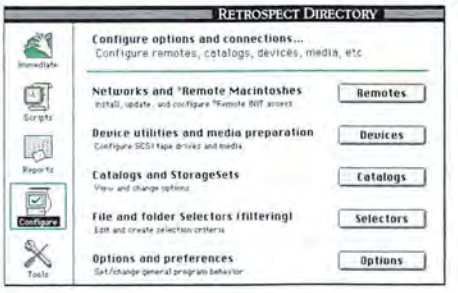
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It slices! It dices! Apple has a new router and — surprise! — AppleTalk isn't the only protocol it supports. The new and improved Apple Internet Router lets you do everything the Apple*Talk* Internet Router 2.0 did and more. This new software router supports the AppleTalk Update-based Routing Protocol (that's AURP to you), which was designed with wide-area-network users in mind. AURP sends out information about an internet's router configuration only when changes occur, rather than sending a complete list of routing information every ten seconds as AppleTalk's standard Routing Table Management Protocol (RTMP) does — thereby **saving beaucoup bucks** for WAN traffickers. AURP also defines how AppleTalk is tunneled through other protocols such as TCP/IP and X.25. For $499 you get the router software (which supports AppleTalk over LocalTalk, Ethernet, and token-ring cabling) and the new DialUp extension for phone-based connections. TCP/IP support costs another $499; X.25 costs $1,299. 408-996-1010.



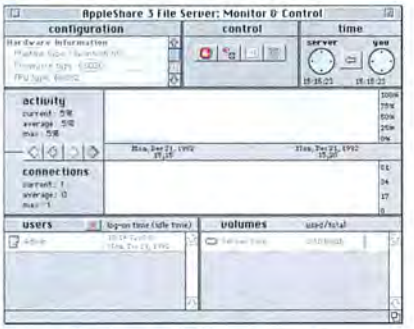
Back up and push: If you're one of those rare people who doesn't use Dantz's Retrospect Remote for your network backup, version 2.0 may push you into the fold. This major new revision is here with a **better user interface** (finally!), support for more backup devices (such as DAT autoloaders), faster verification over networks, and network clock synchronization for backup clients. Retrospect Remote 2.0 costs $449 (for as many as ten remote users) plus $249 for every additional ten users. Upgrades from existing versions are $64.95 plus $2 per remote user. 510-849-0293.



Mapping detail: Now that Apple has finally provided Macintosh SNMP (Simple Network Management Protocol) underpinnings for AppleTalk and TCP/IP, we're starting to see Mac applications take advantage of the **in-depth info** SNMP can provide. Neon Software's LANsurveyor not only makes you a map of your network showing which backbone's connected to which net, it also uses SNMP to retrieve detailed information from individual devices that support the protocol — including Macs. $395 for up to five zones; $695 for the unlimited-zone version. 510-283-9771.



High-level management: If multiple AppleShare servers inhabit your network, you know that Apple hasn't exactly bent over backward to offer help for remote server management. Santorini Consulting and Design (415-563-6398) provides a **standard-of-living improvement** with its Server Manager software, which lets you administer AppleShare 3.0.x servers from afar. With Server Manager's INIT on each server, you can configure all of your servers from your desktop — without Timbuktu! You can also set up Server Manager to monitor the state of your servers and complain to you if they exceed the thresholds you specify. $395 for a single server; $695 for a 5-pack; $995 for a 10-pack; $1,495 for a 20-pack.



By Stephan Somogyi



Cross platforms easily.

New Timbuktu is the easiest way to network Macintosh and Windows computers, so you can share printers, files and screens.

New Timbuktu for Windows 1.0

- Lets you connect to AppleTalk printers and AFP servers.
- You can "browse" network resources with a Windows "Chooser."
- High-performance file exchange and full 24-bit screen sharing.
- Supports over 25 network cards for Ethernet, LocalTalk & Token Ring.
- Supports memory managers including DOS 5.
- Multi-level password security.
- Timbuktu for Windows PhoneNET® kit includes LocalTalk for ISA or MCA.

New Timbuktu for Macintosh 5.0

- New connection documents automatically re-establish connections.
- Backward compatible with previous versions of Timbuktu.
- Dial-in support over ARA or Farallon's Liaison.™



Moving information between Macintosh® and Windows™ computers used to be quite a feat of skill. Let alone nerves.

But now there's Farallon's new Timbuktu® for Macintosh and Windows.

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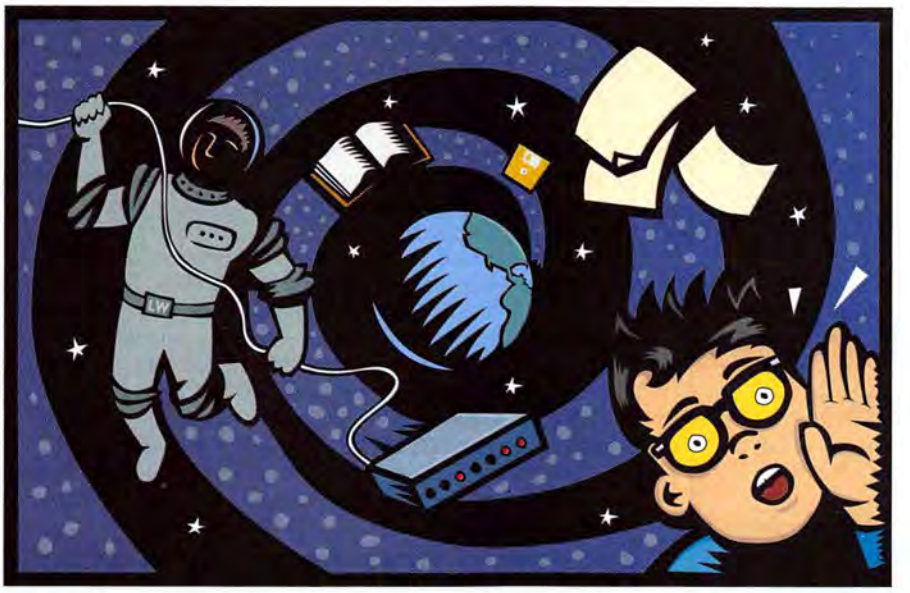
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Out on the Internet



People on computers all over the world are waiting to exchange ideas, news, gossip, opinions, software, and information with you — once you've hooked your Mac up to the Internet.

By Ian Bacon

Sitting in front of your Mac day in and day out can cause tunnel vision. Sometimes you wonder whether the world really exists beyond the confines of your LocalTalk network. Is there anyone out there who cares about the same things you do? Where are the *real* experts when you need them?

Where they are, most likely, is on the Internet. The Internet is an electronic forum without walls, a place where *netters* (see the "Peek at NetSpeak" sidebar) from all around the world can meet in a *cyberspace* of connected computers to find colleagues and friends, share ideas, exchange E-mail and data, "talk" in real time, log on to remote computers, access vast amounts of public-domain software, and become addicted to a network-based news service called *USENET*.

Want to know exactly what Joel said to Maggie as he removed her jeans when she was delirious with appendicitis? Read alt.tv.northern-exposure. Need to discuss your abduction by aliens with others who've had similar experiences? Post a message to alt.alien.visitors or perhaps sci.skeptic. Problems with your Mac? Try comp.sys.mac.system or comp.sys.mac.apps. With USENET and Internet E-mail, you can exchange views with world experts on artificial intelligence, physics, astronomy, or any number of other subjects. During the 1992 presidential election, the Clinton campaign had an Internet connection, so netters were able to ask questions and receive responses straight from the candidate.

ILLUSTRATION: LIN WILSON

"Sounds great," you may say. "Where do I sign up?" Well, it's not quite that simple, because the Internet isn't a commercial service. Entire books have been written to describe the Internet — for example, Ed Krol's *The Whole Internet User's Guide & Catalog* (Sebastopol, California: O'Reilly & Associates, 1992) and Brendan P. Kehoe's definitive booklet *Zen and the Art of the Internet* (the text is available on ZiffNet/Mac in Library 7, filename ZINTPS.SIT) — but we'll try to be a bit more concise here. Basically, the Internet is a collection of high-speed networks that join together to provide a seamless, apparently unified network known as the backbone. To connect directly to the backbone, you need to belong to a major organization with government ties, such as a university or a large company that contracts with government agencies.

But there *are* commercial services that can help you connect a Mac or network of Macs to the Internet. And software tools for accessing Internet services are available in many Mac-specific public-domain forms as well as in a few commercial packages. Which software and means of connection you choose depends on your needs as well as your budget.

Getting Connected

OK, so you're not with a university, large company, or government agency that has a direct connection to the Internet backbone. How do you get your Mac or your network of Macs hooked up?

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Basically, you have two options: Spending a hefty amount of money to connect your Mac directly to the Internet through a commercial gateway or dialing in to a personal account on an Internet-connected computer and using your Mac as a terminal.

Personal Connections. If you just want to connect one Mac to the Internet, you probably don't want the monthly charge to equal your car payment or house payment. Luckily, several commercial services provide accounts on Internet-connected computers, called *telnet* servers, that you can dial in to for a reasonable charge (see the "Dialing In to Cyberspace" sidebar). Bear in mind, though, that the range of Internet services provided with such accounts can be limited — sometimes you get only a USENET news feed, an E-mail connection, and perhaps *ftp* capabilities.

To get an account on one of these systems, you need a telecommunications package and a modem. Typically, there's a monthly connect-time fee that varies depending on how much time you spend connected. Of course, if the number you dial in to isn't local, you'll have a monthly telephone bill to cope with as well.

It's important to remember that with this type of connection, your Mac isn't actually *on* the Internet — it's just acting as a terminal (generally with a command-line interface) for another computer with a direct Internet connection. Because your Mac isn't on the Internet, it doesn't need to be running any Internet-protocol software. A drawback of this indirect connection, however, is that any files you transfer to your server account by using the Internet ftp tool won't get to your Mac until you download them with your telecommunications software — and you can rack up a hefty connection charge during the ftp and downloading process.

To simplify the downloading process and reduce connection costs, InterCon

A Peek at NetSpeak

Like all arcane entities, the Internet has its own language, sometimes known as NetSpeak. Here's a brief initiation:

cyberspace: a name (taken from William Gibson's science-fiction novel *Neuromancer*) sometimes used by netters to describe the Internet or the gestalt experience of Internet communication. Pretentious? Us?

FTP (File Transfer Protocol) or ftp: It's a protocol! It's software! It's even a verb! That's right — you can use an ftp program (which uses FTP) to transfer text or binary files from one system to another over the Internet; then you can say you ftp'ed them.

the Internet: a worldwide collection of hundreds of thousands of computers, tied together via high-speed backbone communications lines to form what appears to users to be a single network. The progenitor of the Internet was an experimental U.S. Department of Defense network called ARPAnet.

MacTCP: an implementation of TCP/IP for the Macintosh (that is, a way for your Mac to communicate with the Internet over a high-speed communications line). It can run in parallel with AppleTalk, so you can still use AppleShare. MacTCP is usually bundled with commercial Internet-software packages; it's also available from the Apple Internet server, ftp.apple.com (Internet address 130.43.2.3).

netters: people who utilize the resources of the Internet.

PPP (Point to Point Protocol): an implementation of TCP/IP designed for use with modems and standard telephone lines. Similar to SLIP but newer and not as commonly used.

SLIP (Serial Line Internet Protocol): an implementation of TCP/IP designed for use with modems and standard telephone lines.

TCP/IP (Transmission Control Protocol/Internet Protocol): the underlying communications protocol for the Internet. It works over high-speed communications lines and guarantees the arrival of transmitted data packets in the order in which they were sent (not as easy to do as you might think!).

telnet: the application used to remotely log on to other systems on the Internet. Also a verb describing the act of using telnet to log on to a system ("I telnetted over to asterix . . .").

USENET: a global news-network system designed to allow netters to exchange information, scream for help, and so on.

user-login-name@machine-name: the standard form of an Internet E-mail address. Each machine name on the Internet is unique and ends with a three-letter extension indicating the type of organization the system belongs to (.com for commercial, .edu for educational, .gov for governmental, .mil for military, and so on).

Systems has produced a software-plus-access package called WorldLink (see the "Dialing In to Cyberspace" sidebar for pricing and contact details). WorldLink gives you a Mac-like interface to Internet E-mail and file-transfer services (see Figure 1), providing the actual connection by way of a telnet server from PSINet. Although you don't transfer the files directly to your Mac, the process is fairly simple: You send an E-mail request to the PSINet server, which gets the file for you after you disconnect and then downloads it automatically the next time you connect. For this to work, however, you need to know the name of the system containing the file and the exact pathname and filename to search for — information you won't necessarily always have. InterCon promises to add to an upcoming version of WorldLink the capability to access USENET (plus the ability to work in real time as well as in batch mode).

Gateways. If you want to go the big-bucks route and use a commercial gateway to hook your Mac or network of Macs to the Internet, you have several options, depending on how much you can afford to shell out monthly.

If most of what you (or the other people on your network) expect to be doing is exchanging E-mail and reading news groups but you still want to have the full Internet access that a commercial gateway can provide, you can get by with a 9,600-bps connection over a standard modem and telephone line. This type of

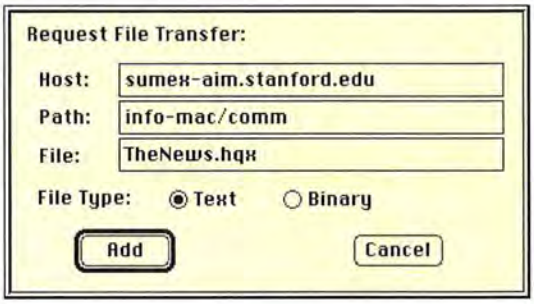


Figure 1: InterCon's WorldLink lets you send and receive Internet E-mail and transfer files across the Internet by using a Mac-like interface to an Internet-connected computer. But file transfer isn't as easy as it could be; you need to know the file's exact name and location.

Dialing In to Cyberspace

Getting a personal account on a larger system connected to the Internet is the cheapest way to get your USENET news and E-mail fix — especially if you call in to a system that provides free accounts. All you pay is your phone bill; if the calls are long-distance, you can often reduce costs by connecting through a public packet-switched data service such as Sprint's PC Pursuit (800-736-1130), which typically costs around $30 per month, or through the CompuServe packet network.

Free Services

M-NET, Ann Arbor, Michigan; dial in to 313-996-4644.

NCOAST, Cleveland, Ohio; dial in to 216-582-2460 and log in as *makeuser* for a new-user account.

UUWEST, Sunnyvale, California; dial in to 408-245-7726.

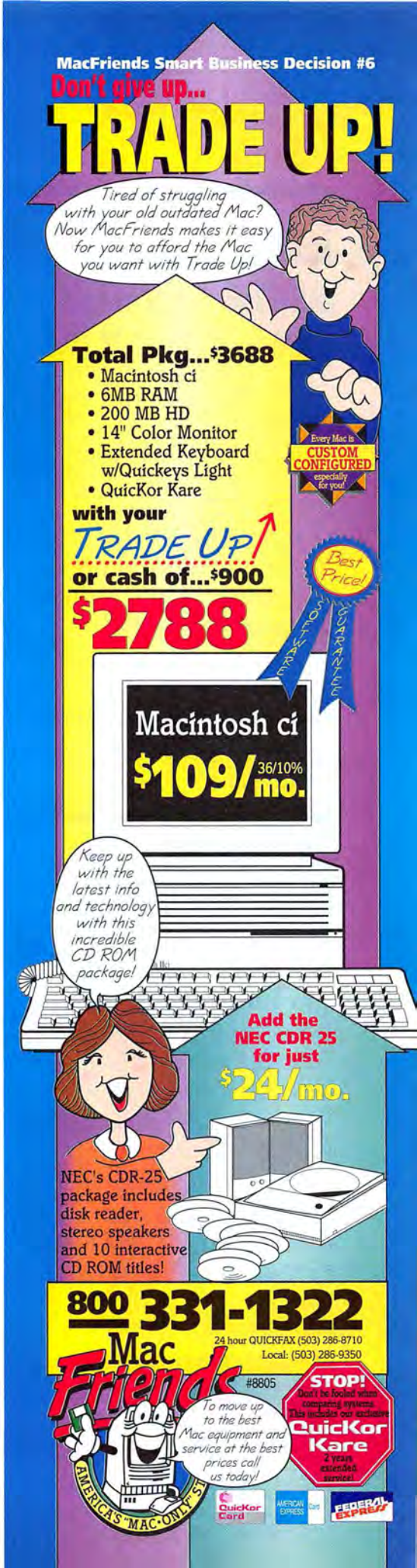
Services That Charge Fees

NETCOM, San Jose, California; call 408-554-8649 for a log-in password and a local access number in the San Francisco Bay Area or Los Angeles. $19.50 per month plus $15 sign-up fee.

Panix, New York; call 212-787-6160 or dial in to 212-787-3100 and log in as *new*. $10 or $19 per month (for low-level or high-level access) or $100 or $208 per year, plus $40 sign-up fee.

PORTAL, Cupertino, California; call 408-973-9111 or dial in to 408-725-0561 (or 408-973-8091 for faster access) and log in as *new*. $19.95 per month plus $19.95 sign-up fee; long-distance calls accessible through PC Pursuit or Tymnet.

WorldLink, from InterCon Systems, Herndon, Virginia; call 703-709-9890. This is a software-plus-access package; the WorldLink software includes a subscription to a PSINet server. The WorldLink software costs $19.95, and the monthly cost for PSINet access is either $19.95 (E-mail only) or $29.95 (E-mail, ftp, and USENET); the first month is free with the software purchase.



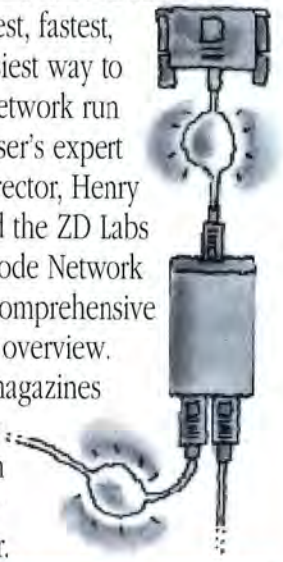
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The future is looking colorful when MacUser takes an in-depth look at color LCDs. In June, the MacUser Labs examines 20 projectors, panels, and stand-alone displays for color, brightness and everything else to make a business buyer's decision easy. If you give presentations on the move, consider moving to color LCD technology. Say you saw it in MacUser.

NETWORK BOTTLENECKING



What's the best, fastest, cheapest, easiest way to make your network run better? MacUser's expert Technical Director, Henry Bortman, and the ZD Labs create a 50-node Network to deliver a comprehensive performance overview. How many magazines do this much for Macintosh buyers? Only one: MacUser.

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service costs about $3,000 to start, but the recurring costs are low compared with those of faster connections, which run around $200 per month. To make a 9,600-bps connection, your Mac needs to communicate by using a version of the Internet protocol that runs over standard phone lines — either *SLIP* (Serial Line Internet Protocol) or *PPP* (Point to Point Protocol). This software isn't hard to come by. Many serial-communications packages, such as Synergy Software's VersaTerm-PRO, include SLIP.

If you need a somewhat faster connection — say, for downloading software, sending data files to others fairly regularly, and perhaps logging in to remote computers a few times per day — you should consider stepping up to the 56-Kbps speed of a fractional T1 dedicated-access phone line. It'll cost you about $15,000 to install, though, and monthly costs may be close to $2,000. The price you pay includes a Cisco router that the gateway company installs at your site. Your Macs must be on an Ethernet network and running a version of the Internet's TCP/IP protocol such as Apple's *MacTCP*. Alternatively, for about half the startup costs and slightly lower monthly recurring charges, you can install a dedicated X.25 or ISDN communications line that operates at a speed similar to that of a fractional T1 line.

If your needs are even greater — for example, if you expect to transfer many megabytes of data across the Internet daily or if you expect to log in to remote computers hundreds of times a day — you'll probably need to bite the bullet and get a high-speed T1 (2 Mbps) connection. Startup costs are about the same as for the fractional-speed T1 line, but the monthly cost jumps to around $4,000.

With any of these direct-connection methods, you also have to go through the process of obtaining an official Internet membership for your system. You can

A Low-Cost Internet Toolbox

If you get your Mac a direct connection to the Internet, you also need to get Mac versions of the basic Internet tools. Fortunately, virtually all these tools are available from public-domain sources, such as the ZiffNet/Mac Download & Support Forum or the Internet-software archive known as Archie (simply use your telnet software to log on as *archie* to archie.cs.mcgill.edu). With very little expense, you can get a versatile toolbox to help you access the following Internet services:

File Transfer. To transfer files, you need an *ftp* program such as **Fetch** or **XFerIt** (filenames FETCH.SEA and XFERIT.SEA, respectively, on ZiffNet/Mac). Fetch tends to assume that you know exactly where everything you want is located, whereas XFerIt lets you browse through available folders.

Logging On to Remote Systems. To navigate among systems and log on to those on which you have accounts, you need a *telnet* application such as **NCSA Telnet** (filename TELNET.SEA on ZiffNet/Mac), which is put out by the National Center for Supercomputer Applications. NCSA Telnet also supports a rudimentary ftp capability.

Identifying Other Users. To find out if someone you want to reach is logged on to a particular system or just to find out who *is* logged on, you need a finger program. **Finger** for the Mac is simple to use; just enter the E-mail address of the person or system you want to investigate, and the program does the rest. Single-user version, $5; site license, $150.

Real-Time Communications. To communicate in real time with someone on another system, you need a talk program. Developed by the author of Finger, **Talk** has the same simple interface; you can talk to anyone whose E-mail address you know. Single-user version, $5; site license, $250.

Electronic Mail. For E-mail access, try **LeeMail** or **Eudora** (filename EUDORA.SEA on ZiffNet/Mac). LeeMail is simpler and faster to set up, but Eudora is cheaper and more widely used, hence potentially more convenient. Each lets you attach documents or applications to messages you send; if the recipient is running the same mail package, you can even send Mac applications or documents. Eudora has no shareware fee, whereas LeeMail costs $10 for a single user (site licenses vary according to the number of users).

News Readers. To read USENET news, you can use **Newsreader** or **The News.** Newsreader was put out by Apple employees and is free. The News provides a more complete implementation of the standard UNIX *nn* news reader and has a shareware fee of $25 for single users (site licenses vary according to the number of users and the type of facility).

get your unique Internet domain name and a range of Internet addresses from a coordinating body called the Network Information Center, or NIC (call 703-802-4535, and ask for the Hostmaster).

Of course, you'll also need to find a gateway provider. Companies that can provide a hookup anywhere within the U.S. include UUNET Technologies (800-488-6383 or 703-204-8000) and CERFnet (800-876-2373 or 619-455-3900). For a more extensive list of Internet service providers, see *The Whole Internet User's Guide & Catalog,* by Ed Krol.

Necessary Software Tools

Once you're connected to the Internet, you may or may not need additional software tools — it depends on what type of connection you have.

Personal Packages. If you have a personal account on a telnet server, you really don't need any software besides the telecommunications package that lets your Macintosh act as a terminal for the Internet-connected server. The server is generally a computer running UNIX, requiring you to type UNIX commands in order to access the Internet services available to you (for example, USENET, E-mail, and ftp). The number of commands you need to know isn't all that large, and you generally get a tutorial with your telnet-server subscription to bring you up to speed.

If the thought of a command-line interface is enough to make you throw your keyboard at a wall, you may prefer to go with InterCon's WorldLink software. As mentioned, WorldLink includes file-transfer capabilities as well as a subscription to InterCon's telnet server.

Direct-Connect Tools. If your Mac is directly connected to the Internet, you need more than just the Internet-protocol software (such as MacTCP or SLIP) that lets your Mac communicate with the Internet. You also need Mac versions of (or interfaces to) the standard Internet tools and services: USENET, E-mail, file transfer (ftp), remote log-ins (telnet), user identification (finger), real-time communications (talk), and information or software searches. Fortunately, public-domain Internet tools for the Mac abound (see the "Low-Cost Internet Toolbox" sidebar) and there are also two commercial packages that combine several of these tools in one application.

TCP/Connect II, from InterCon Systems (703-709-9890), has two flavors: basic and extended. The basic package ($195) gives you telnet and ftp capabilities — that is, it lets you log on to or get files from a UNIX system (by emulating a VT100 or 3270 terminal). The extended package ($495) adds finger, mail, and news capabilities with a Macintosh-like interface, plus a bunch of other terminal emulations. The extended package also supports the SLIP protocol for communication over standard phone lines.

Pathways Access ($295 for the Mac version, $395 for the DOS or Windows version), from the Wollongong Group (415-962-7100), offers similar capabilities to those of the basic version of TCP/Connect II — it's an ftp and telnet system only. It does allow your Mac to become an ftp server, however, so your UNIX friends can grab stuff from your system instead of always the other way around. Terminal emulations for telnet include VT100s and several Tektronix graphics terminals. The ftp implementation has a Mac-style interface but seems to often lose the type/creator information associated with Mac files, which makes the files useless unless you have ResEdit handy.

How do the commercial offerings compare with the available shareware? The commercial products provide many functions plus many terminal emulations in a single package, and they offer the convenience and the support you'd expect from commercial companies. If you can make do with VT100 terminal emulation and don't mind juggling applications, shareware offers an inexpensive way to get the same types of capabilities.

To Boldly Go . . .

Whether you've got just one Mac or a network of Macs, there are tools available to connect you to that vast region of cyberspace known as the Internet. Via the Internet, you can access hundreds of thousands of systems and exchange news and ideas with people all over the world. You can find databases concerning demographics, extragalactic objects, and even the entire text of Dante's *The Divine Comedy.* Or you can talk to experts in virtually any field you can imagine. Whatever you need, there's a good chance you'll find it on the Internet.

Ian Bacon, a.k.a. ian@tsg.com, disappeared into cyberspace several years ago and has lived there ever since. He surfaces occasionally on various USENET news groups.





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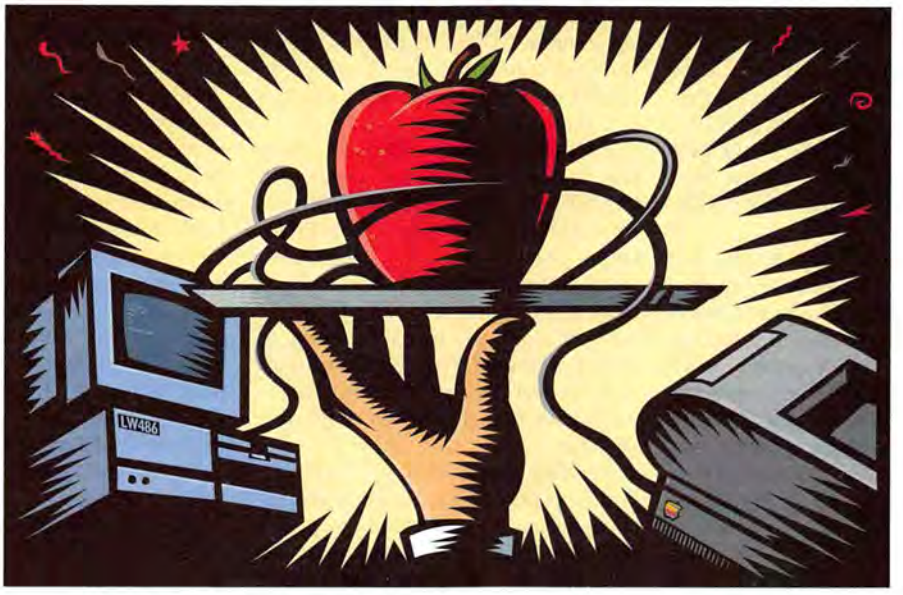
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AppleTalking the PC Way



AppleTalk's far from dead — here are still more ways to make PCs running DOS and Windows talk to those enticing AppleTalk printers and file servers.

By John Rizzo

During a recent trip to Hong Kong, I had a chance to ask some of its residents how they felt about the impending takeover of the British colony by the mainland Chinese in 1997. Most businesspeople figure the Communists won't tamper with Hong Kong's gung-ho capitalist system, mainly because it works. On a personal level, however, many were afraid the giant across the border would roll over them and extinguish Hong Kong's unique culture.

What does this have to do with the price of tea in Cupertino? Nothing, except that when I returned to the States, I began noticing similar feelings expressed about AppleTalk. Outwardly, Mac supporters seem bolstered by Apple's increasing sales (Apple sold its 10 millionth Mac this year) and prominence — even President Bill Clinton is a Mac user. At the same time, they worry about the foreign giants next door, TCP/IP and Novell NetWare. One giant has network managers talking of the day when they can eliminate all infidel protocols and run TCP/IP-pure networks. This talk has led to improbable rumors that Apple will replace AppleTalk with TCP/IP in every Mac, in an effort to be modern. The other giant, Novell, is preparing IPX for Macintosh, a native-NetWare-protocol stack for Macs (similar to MacTCP) that some say will make AppleTalk unnecessary. This development effort has spawned equally improbable rumors that AppleTalk will disappear in an Apple/Novell merger.

I don't know what will happen to Hong Kong, but I'm willing to bet that Apple will keep on investing in AppleTalk, for the same reason Asian businesspeople are still investing in Hong Kong: It works well. AppleTalk is cheap and easy to set up — the network for the rest of us. There are even good reasons to run AppleTalk on PCs: It gives them direct access to PostScript printers as well as enabling file sharing with Macintoshes.

It seems that several networking companies agree with this reasoning, because they've been introducing new products that enable a PC running DOS and Windows to use AppleTalk without having to resign from its PC networks. Last month I told you about Farallon's latest such product, PhoneNET PC 3.0 ($199, or free with the Timbuktu for Windows multiplatform screen-sharing program, also priced at $199). This month I'll discuss another AppleTalk-for-Windows software product, COPSTalk for Windows, which actually shipped before Farallon's Windows version. I'll also give you a preview of a product still in the works, the Coactive Connector, from CCC (Coactive Computing Corporation).

COPSTalk, Printers Listen

COPSTalk for Windows, from COPS (CoOperative Printing Solutions), is a PC AppleTalk product that focuses on power PostScript printing and has some file-sharing features as well. COPS' experience in PostScript printing is evident in PServe, an AppleTalk print-server application for Macs and

ILLUSTRATION: LIN WILSON

PCs that happens to run only on PCs (see "Policing the Print Queue," October '92, Buyer's Guide page 16). Not only does COPSTalk give Windows users access to AppleTalk PostScript printers but it also offers advanced printing features that surpass the capabilities of both PhoneNET PC and the standard Mac. The user interface, however, isn't as smooth as that of PhoneNET PC — mainly because COPSTalk is not well integrated; it consists of six separate utilities accessible from each other's Windows menus.

Printing Power. Like PhoneNET PC, COPSTalk has a Chooser-like window (in this case, a separate application called WinChoose) that you use to select an AppleTalk zone and a printer (after you've set up your printer drivers, using standard Windows methods). COPSTalk goes even further, though, letting you create lists of printers you can use to access your favorites — an easier process than scrolling through a bunch of zones and printers to find the one you want. You can create groups that contain printers located in different AppleTalk zones; set up multiple groups for different tasks; and assign different options to each printer (the options include banner-page printing, error alerts, and activity logs).

If you want to get into even fancier printer tricks, you can create what COPS calls an alias for a printer and set up a custom printer configuration to get PostScript features unavailable to the standard Windows driver — capabilities such as paper-tray changes and the printing of special characters. The printer alias attaches your print job to a *preamble file,* a text file containing the PostScript code needed to invoke these special features. We're talking real power-user stuff here, because you have to supply the code yourself.

Going beyond control of how jobs print, COPSTalk also gives you more control over what jobs print where. Its WinQue application is a background print spooler along the lines of the Mac's PrintMonitor, only more powerful. You can assign priorities to print jobs, change the order in which jobs print by clicking and dragging them, put jobs on hold, and move print jobs to different printers. You can also convert ASCII files to PostScript when printing them from the spooler — a handy feature in the PC world, where ASCII rules. And if you're in too much of a hurry to wait for a printer to print other users' jobs, just assign a group of printers to your job; WinQue automatically finds an available printer from among the group. Alternatively, if you're not interested in any of these fancy printing features, COPSTalk lets you bypass WinQue altogether and connect an AppleTalk PostScript printer to a PC's LPT port.

If all these features still don't satisfy the power user in you, check out COPSTalk's DownWin utility; it uses AppleTalk's PAP (Printer Access Protocol) to give you even more control over PostScript printers. DownWin lets you rename and restart a printer; get a font list from a printer's hard disk, ROM, or RAM; and install Type 1 PostScript fonts on the printer. You can also send a file to the printer from DownWin, bypassing WinQue.

Serving Some Files. Although PostScript printing is its focus, COPSTalk also enables Windows users to access AFP-compatible network volumes such as AppleShare file servers and Mac folders shared by use of System 7's File Sharing command. Unfortunately, COPSTalk doesn't use the standard Windows interface, which mounts a network volume as an icon in Windows' File Manager (PhoneNET PC uses this method); instead, COPSTalk uses a separate program called WinShare. WinShare doesn't allow click-and-drag copying of files but rather works much like Apple's old Font/DA Mover used to work. Fortunately, COPS has indicated that it will implement a File Manager icon in a future release.

Good COPS, Bad COPS. Although COPSTalk has some impressive capabilities — especially for printer control — the COPS approach of using half a dozen separate applications has its drawbacks. For example, the learning curve for all these applications is steeper than seems necessary. Also, error messages from the different applications aren't well coordinated — I once got a message telling me that I was already logged on to a server, followed by another telling me that I was not logged on to any server! Fortunately, COPS does have helpful and patient tech-support personnel, as I discovered when I called (without identifying myself as a *MacUser* editor).

COPSTalk also loses some points for lack of versatility when compared with PhoneNET PC. Version 1.01 runs under Windows only, whereas PhoneNET PC works with both DOS and Windows. In addition, PhoneNET PC runs on more network-interface cards; COPSTalk runs on most of the LocalTalk cards available for PCs, but it supports only 3Com's Ethernet cards and it doesn't run on token ring at all.

However, as the COPSTalk manual tells you, you can run the COPSTalk printing services *on top of* the PhoneNET PC AppleTalk software, allowing you to use cards that PhoneNET PC supports. Although COPS doesn't guarantee that COPSTalk will work with every board supported by PhoneNET PC, company representatives say that they have tested this setup with a variety of Ethernet cards. To set up a PC in this way, you need to install PhoneNET PC and COPSTalk and then delete Farallon's virtual-device driver and run the COPS COMPAT utility, included with COPSTalk. COPS also includes several DOS utilities to help you troubleshoot your PC's network connection.

Newcomer to LocalTalk

If COPSTalk and PhoneNET PC sound like overkill for the simple LocalTalk Mac-and-PC network you have in mind, you may be interested in the Coactive Connector from CCC (415-802-1080). A hardware-plus-software product not shipping at press time, the Coactive Connector makes AppleTalk print and file services available to DOS and Windows users. CCC says the Coactive Connector is "not a corporate product" — an unusual claim for a product intended for the networking market.

For the low price of $149, the Coactive Connector gives you both the software and the network hardware you need to build a small AppleTalk network, but it has several limitations. It works only over LocalTalk cabling (230.4 Kbps), not over Ethernet or token ring, and you can use only CCC's network-interface hardware, which plugs in to the PC's parallel port. The connector is actually a parallel-to-LocalTalk connector containing a 68000 processor and some built-in software.

On the plus side, CCC claims that the Coactive Connector is the easiest multiplatform-network product to set up and use. Plugging in to the parallel port, the Coactive Connector eliminates the often-complicated process of installing a board inside the PC. In addition, the

Coactive Connector's software automatically mounts all AFP volumes in an AppleTalk zone as directories in the PC's N: drive (although if you want to select a file server in another zone, the Coactive Connector is no easier to use than PhoneNET PC or COPSTalk). One special feature of the Coactive Connector is its ability to turn PC directories into AFP volumes, letting Mac users mount PC directories.

Of course, I can't really say how well this and other features work until after the product ships, which it's expected to do sometime in April. I'll give you a more in-depth report on the Coactive Connector in a future column.

Betting on AppleTalk

If the Coactive Connector turns out to be as easy to set up as CCC claims it is, it will truly bring the plug-and-play aspect of AppleTalk to the PC. Installing either PhoneNET PC or COPSTalk is still more difficult than connecting a Mac to a network — you may have to fiddle with jumpers on the network card and twiddle with various *.INI, AUTOEXEC.BAT, and CONFIG.SYS files.

Because they can run on Ethernet, the Farallon and COPS products will give you better performance, and they're both currently shipping. Of the two, Farallon's PhoneNET PC is more flexible and provides better file sharing. COPSTalk doesn't have anything like the screen-sharing features of Farallon's Timbuktu bundle, but it does have much more powerful PostScript-printing utilities.

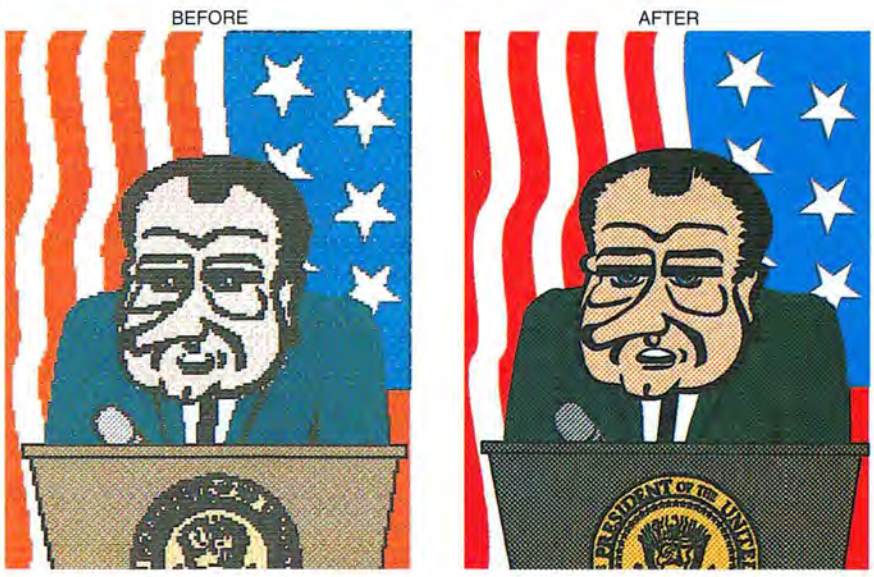
Of course, there's still more to be done with AppleTalk for PCs — ARA (AppleTalk Remote Access), for instance, is not available for PCs yet. Some people say ARA for PCs is about as likely as an Apple/Novell merger — but then, that's what they once said about layoffs at IBM

John Rizzo, a *MacUser* technical editor, is the author of *MacUser Guide to Connectivity*, published by Ziff-Davis Press.

3½

COPSTalk for Windows 1.01
Published by: COPS (CoOperative Printing Solutions), Inc., 5950 Live Oak Parkway, Suite 175, Norcross, GA 30093; 404-840-0810.
List Price: $179.

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CIRCLE 59 ON READER SERVICE CARD.

PERSONAL MACINTOSH



Go ask Alice: Describing the new CD-ROM disc from Cameo Interactive isn't easy. Try imagining a more full-color version of Cyan's The Manhole — for adults. Or how about a cross between the surrealism of Henri Magritte's paintings, the deadpan wit of Yoko Ono's *Grapefruit,* and the graphical intricacy of Nick Bantock's *Griffin and Sabine?* Still have trouble picturing it? You may have to see it for yourself. Alice is actually a collaboration among **three Japanese artists:** painter Kuniyoshi Kaneko, musician Kazuhiko Kato, and computer-graphics artist Haruhiko Shono. It's similar to The Manhole in that you wander around the rooms of an interactive museum, clicking on objects and paintings to see what happens. Although not exactly a game, Alice sets a goal for you: Turn up 53 hidden playing cards, some of which contain clues that unlock further secrets of the museum. Alice is stylish; witty; and unfortunately (on our middle-of-the-road CD-ROM drive), excruciatingly slow. Nevertheless, it's a glimpse of what multimedia adult entertainment may look like very soon. 800-833-8339 or 213-848-8436. $99.



Mandelbrot mania: Say you're Jerry Garcia and your fall line of psychedelic neckties is breaking sales records everywhere. You need some more **mind-blowing graphics ideas** and fast, but where to get them? Enter Kaleidoscope, from Abbott Systems. Here's a $49 piece of software that does nothing but generate Mandelbrot fractals that you can save as PICTs. We doubt that it has any practical use (except for Mr. Garcia), but it sure makes pretty pictures, so we had to include one here. 914-747-4171.



Games, games, games: Lots of new games have been appearing of late, probably in the hope of finding a home with one of the zillions of new Performa or LC II owners. Too many of the ones we've seen are **boring DOS ports,** but a couple of sequels to old favorites might be worth a look if you enjoyed the originals. Sherlock Holmes, Vol. 2, from ICOM Simulations, looks just like the original Sherlock Holmes CD-ROM, but it presents three new cases for London's master sleuth to solve. $69.95. 708-520-4440. ♦ Spectre Supreme is the sequel to Velocity Development's Spectre. The $69.95 Supreme version features more scenery, more enemies, more weaponry, more network games, and more mayhem in general. 415-776-8000. ♦ Finally, the latest volume in Hayden's excellent Cool Mac series of books is *Cool Mac Games Plus!* Once again, software is bundled with the book. This time, of course, you get a selection of games (shareware) including **the best Mac shareware game** of all, Solarian. There's even a copy of Victoire!, the cheatin — er, morally ambiguous control panel that lets you score more points by adding lives, bullets, shields, or whatever to your favorite games. Definitely not approved by the International Olympic Committee. $24.95.



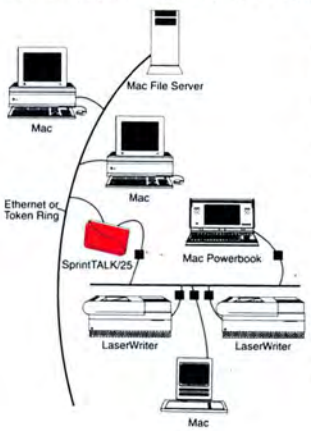
By James Bradbury

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...on Token Ring. Until now, it couldn't be done without routers, time and expertise. But our new SprintTALK™/25T print server makes LocalTalk to TokenTalk easy. It supports up to **eight** LocalTalk devices, including printers, Macs, Powerbooks and compatibles on any 802.5 Token Ring network. Just like our Ethernet version, it configures in seconds, works with all popular Mac applications and displays the selected printers in the familiar "Chooser" window.



SprintTALK/25 connects up to eight LocalTalk devices to high-speed corporate LANs.

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SprintTALK/25	SPTLK25E	Ethernet 10BaseT and BNC Thinnet	AppleTalk	DIN8 LocalTalk	Up to 8 LocalTalk printers/devices	512Kb RAM 256Kb ROM	$545
	SPTLK25T	4/16Mb Token Ring DB9 and RJ45	AppleTalk	DIN8 LocalTalk	Up to 8 LocalTalk printers/devices	512Kb RAM 256Kb ROM	$1095
SprintTALK/200	SPTLK200E/AN	Ethernet 10BaseT and BNC Thinnet	AppleTalk/ Novell	DIN8 LocalTalk, 1 parallel 1 Uniport	Up to 8 LocalTalk printers/devices, 1 parallel PostScript, 1 parallel or serial PostScript	2Mb RAM, 512Kb Flash ROM	$1295
	SPTLK200T/AN	4/16Mb Token Ring DB9 and RJ45	AppleTalk/ Novell	DIN8 LocalTalk, 1 parallel 1 Uniport	Up to 8 LocalTalk printers/devices, 1 parallel PostScript, 1 parallel or serial PostScript	2Mb RAM, 512Kb Flash ROM	$1495

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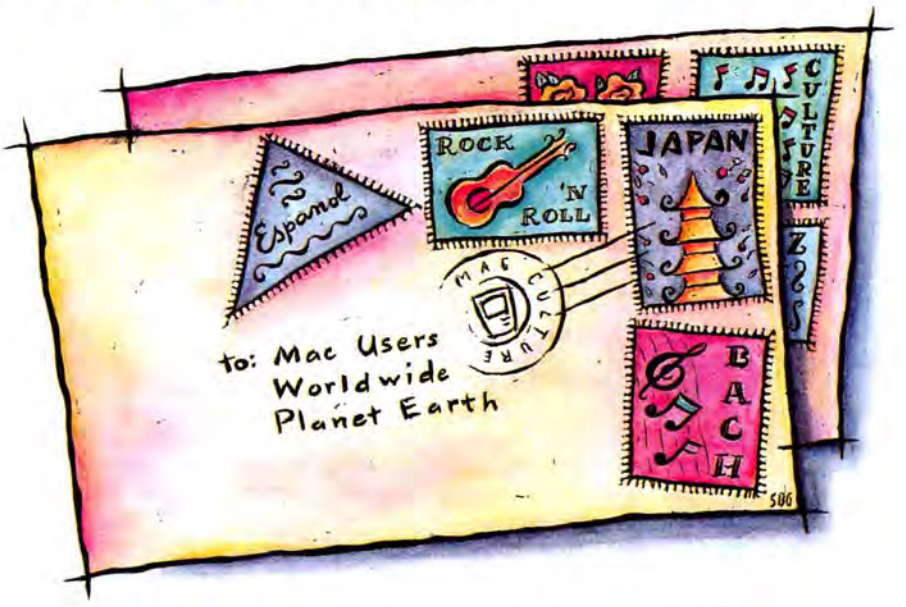
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CIRCLE 135 ON READER SERVICE CARD.

Join the Culture Club



Where can a Texas headbanger get culturally enlightened and have fun at the same time? Only on the Mac.

By Bob LeVitus

Every kid wonders about it sooner or later: Why can't attending school be as much fun as going to the movies or playing a video game?. Well, it can, and it's called *edutainment.* On the Mac, of course, edutainment means an interactive multimedia program that educates as it entertains. It's a seductive idea, but until recently, not much software (for grown-ups, anyway) has delivered on it. That's changing, however. This month we'll look at programs that manage to be both fun and educational.

Some of the coolest interactive software delivers what I call culture-on-a-disk. I live in Austin, Texas. It's the finest place I've ever lived, and I've lived in a lot of places. So exploring other cultures without leaving Austin — the live-music capital of the world — was particularly appealing to me. Without having to miss a single Arc Angels concert on Austin's famous Sixth Street, I managed to teach myself rudimentary Spanish, using the Berlitz Method, and explored the people and languages of exotic Japan. Without missing one David Garza gig at the Cactus Cafe, I listened to and learned about a wide variety of early and baroque music and taught myself to be a rock-and-roll star.

ILLUSTRATION: SUSAN GROSS

Bach and Before

My musical tastes run more toward Nirvana and Led Zeppelin, so the Bach and Before CD-ROM compendium of ancient music and classical compositions seemed kind of alien to me. Even so, I was surprised at how much I enjoyed it. The HyperCard-based program contains nine essays by music critic Alan Rich. These comprise the history of Western music from its beginnings in the ancient world through the development of baroque music to Bach and Handel. Each essay is liberally laced with black-and-white illustrations and musical examples. The music is CD-quality, featuring excerpts from more than 40 audio CDs. A nice touch: The package includes a coupon for $2 off on any or all 40 audio CDs at Tower Records or Tower Records Mail Order (so you could save as much as $80 if you bought them all).

In addition to the essays, the program includes an extensive catalog that lists the musical examples along with complete discographical information and suggestions for further listening. There's also a glossary. The entire program is hypertext-linked (linked words are underlined in gray), so you can see the proper glossary item with a single mouse click. Comprehensive Balloon Help makes the program easy to use.

Thanks to Bach and Before, I discovered that one of my favorite Blood, Sweat, and Tears songs ("Gymnopédies") was written by Erik Satie (1866 – 1925) and that the tune was "his own image of Greek music: a supple, simple melody with frequent changes of meter."

I'd heard of Gregorian chant, of course, but had never actually listened to one. Now I have. (It's not my cup of tea!) I even fell in love with a classical composition, Bach's *The*

Passion According to St. Matthew, and learned that it features grieving arias. (And I know what an aria is too. It's a song in opera, sometimes lengthy and quite complex. Not bad for an old rock and roller, eh?)

Bach and Before is enjoyable, affordable, informative, and fun. I highly recommend it.

Exotic Japan

I'm going to be traveling to Tokyo right about the time you read this, so I was particularly excited to find Voyager's Exotic Japan CD-ROM in the pile of programs on my floor. Exotic Japan is a wonderful interactive introduction to Japanese culture and language.

Primarily made up of lessons and quizzes, Exotic Japan runs the gamut from manners to modern society, from handy travel tips to useful Kanji (pictographic or ideographic writing characters). The written language is illustrated by wonderful mnemonic animations, such as a line drawing of the sun that transforms itself into the Kanji character for the sun. Learning and pronouncing Japanese words is particularly easy. Hundreds of words in the text are underlined; click on an underlined word, and you'll hear a voice pronounce it properly. You can click on hypertext-linked words in bold type to get transported to related topics or glossary entries.

There are scanned images of Hiroshige Ando's beautiful wood-block prints, "The 53 Stations of the Tokaido Highway." The stations appear as interludes between lessons and quizzes and are accompanied by short selections of traditional Japanese music.

Exotic Japan runs the gamut from manners to modern society, from handy travel tips to useful Kanji (pictographic or ideographic writing characters).

Exotic Japan is more expensive than a book, but the animated Kanji characters, pronunciations, and hypertext links make it worth every penny if you want to learn about the culture and language of Japan.

Poetry in Motion

Ron Mann's Poetry in Motion is a fine example of multimedia that works, a first-rate collection of QuickTime-movie performances by some of today's most interesting poets — Charles Bukowski, William S. Burroughs, John Cage, Jim Carroll, Tom Waits, Alan Ginsberg, and 18 others.

Mann filmed more than 85 poets and says he "made some hard editing decisions" to ensure that the CD-ROM contained only performances that really moved him. Some of them moved me.

Ginsberg's thrash-rock performance of "Capitol Air" is a must-see; Carroll's haunting and strange "Just Visiting" is engrossing. Although you might find Bukowski's contribution gross, I thought it was pretty funny.

The program's format is elegant — choose one of the 24 poets from the always-available Contents page, and you'll see a QuickTime movie of the performance, a QuickTime movie of an interview, or (in most cases) both. The poem's text appears to the right of the movies. If you click on a sentence in the text, you'll see and hear that sentence in the movie. It's a simple, no-nonsense interface that works perfectly with the performances. I wish the movies were bigger, but I always wish QuickTime movies were bigger.

If you enjoy modern poetry or even if you have only a passing interest, Poetry in Motion is the best of the best. Although some of it is very strange and some of it offensive, Poetry in Motion always offers a stimulating, fascinating look at modern-day poetry and poets.

Berlitz Think & Talk Spanish

Berlitz Think & Talk courses (I looked at Spanish; French, German, and Italian are also available) teach you a foreign

Table 1: Fun Ways to Learn

	Bach and Before ★★★★½	Berlitz Think & Talk Spanish ★★★½	Culture 2.0 ★★★	Exotic Japan ★★★★	Poetry in Motion ★★★★	So You Want to Be a Rock and Roll Star ★★★★
List price	$24.95	$199	$249	$99.95	$29.95	$99.95
Pros	Low price. CD-quality audio. Interesting text.	Self-paced study. Builds 1,000-word vocabulary in weeks.	Well organized. Good depth and breadth. CD-ROM drive not required.	Interesting, useful information. Well organized and presented. Spoken word pronunciation.	Excellent application of multimedia. Some spellbinding performances.	Excellent use of media. Good interface.
Cons	May result in high CD bills.	No animation.	Expensive. No color or animation. Requires 11 MB of hard-disk space.	Expensive.	Movie size on-screen is small.	Slow to launch and open songs.
Company	The Voyager Co. 1351 Pacific Coast Hwy. Santa Monica, CA 90401 310-451-1383	The HyperGlot Software Co. P.O. Box 10746 Knoxville, TN 37939 800-726-5087 615-558-8270	Cultural Resources 30 Iroquois Rd. Cranford, NJ 07016 908-709-1574	The Voyager Co. 1351 Pacific Coast Hwy. Santa Monica, CA 90401 310-451-1383	The Voyager Co. 1351 Pacific Coast Hwy. Santa Monica, CA 90401 310-451-1383	Interactive Records 921 Church St. San Francisco, CA 94114 415-285-8650

language in record time. The "world-famous Berlitz Method," used in classrooms and videotape and audiotape courses for many years, is based on the premise that we learn things by doing them. The Berlitz Method teaches you Spanish by speaking Spanish, not by speaking about Spanish in English.

Each course consists of 50 lessons, each of which has four modules: Listen and Understand; Read; Write; and Think and Talk. The lesson material is ideal for the interactive multimedia format, but HyperGlot's implementation doesn't take full advantage of it. The most obvious omission is animation. Although Berlitz Think & Talk includes numerous still pictures, even simple animation would be more effective. And the lessons could be more interactive than they are.

Even so, the course works. In just a few days, I learned more Spanish than I ever did in high school. If I needed to learn a language quickly and easily, I'd take the current batch of HyperGlot Berlitz courses over classroom instruction any day.

So You Want to Be a Rock and Roll Star

So You Want to Be a Rock and Roll Star is a nifty idea — a CD-ROM featuring six popular songs from the golden age of rock 'n' roll ("Twist and Shout," "Stand by Me," "Runaway," "Midnight Hour," "Dock of the Bay," and "Crazy") that you can sing or play along with.

You begin by choosing a song from an animated jukebox, and then you choose whether you want to hear the song with all the performers or hear it with no vocals, no guitar, or no keyboards. It's a high-tech form of karaoke (which I learned means "empty orchestra" when I explored the Exotic Japan CD-ROM). You can sing or play along with the animated band or sheet music, but there's more. Much more.

There are guitar and keyboard lessons. I'm not much of a guitarist, but I managed to learn three songs in one day with these lessons. They work.

The CD-ROM includes a detailed musical analysis (a QuickTime movie) of each song and, my favorite part, a history of the song and of some of its best-known performers (likewise a QuickTime movie). Del Shannon's bio includes a sound bite of Peter and Gordon's "I Go to Pieces," which Shannon wrote; Ben E. King's bio includes a snippet of John Lennon's rendition of "Stand by Me."

Overall, it's an impressive piece of work. The only problem with So You Want to Be a Rock and Roll Star is that it loads slowly. On my Mac IIfx, it took almost a minute and a half to launch the program and more than a minute to open a song. But once you have a song loaded, this CD-ROM is two hoots and a holler.

Culture 2.0

Culture 2.0 comes on a whopping ten 800K floppy disks and requires 11 megabytes of free space on your hard disk. It's a HyperCard-based hypertext Multimedia Guide to Western Civilization.

The program slices Western civilization into nine periods: Biblical (1800 B.C. to 250 A.D.), Greece (1260 to 264 B.C.), Rome (753 B.C. to 476 A.D.), Middle Ages (400 to 1400), Renaissance (1400 to 1600), Baroque (1600 to 1750), Classic (1750 to 1803), Romantic (1803 to 1912), and 20th Century (1912 to 1991). Each period offers subperiods and subcategories for the major nations plus essays on art, music, religion, philosophy, and science.

The Multimedia Guide to Western Civilization was no small undertaking. It contains more than 4,500 cards; 20,000 text links; hundreds of graphic images of famous people, places, and works of art; maps covering various developments in Western culture; and 120 signature melodies of famous composers.

I had a great time exploring this stack, reading a little about this age and that empire. I also liked the almanac, in which you just type any date to see a list of significant events and births and deaths of famous people on that date.

Culture 2.0 is authoritative and well organized. The interface is intuitive and works well for either exploring randomly or finding a particular piece of information quickly. What it's not is flashy or glitzy. There are songs, chants, and black-and-white pictures but no color and no animation. My biggest complaint is that it's the most expensive product I looked at this month. Still, the program is good, and it's obvious that a great deal of effort went into the research and programming. If the subject matter interests you, you might consider it a bargain.

Bob LeVitus is the author of *Dr. Macintosh, Dr. Macintosh's Guide to the On-line Universe*, and lots of books with the word *Stupid* in the title.



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CIRCLE 241 ON READER SERVICE CARD.

What's Up? Docks!



Computer Care, Envisio, E-Machines, and RasterOps deliver Duo docks, and Digital Ocean's Grouper brings PowerBooks into the era of wireless networking.

By Henry Bortman

If you're thinking of going Duo, you're probably in the market for a dock. Maybe two. Undocked Duos, as you may recall, although fabulously lightweight and compact, aren't quite as connectable as are most Macs. They contain a single, LocalTalk-capable serial port and — if you purchase Apple's optional internal Express Modem — an RJ-11 jack for connecting the modem to a phone line. That's it. No place to plug in a mouse. No floppy drive and no port for connecting one. No video-out capability. No SCSI port for connecting external hard-disk drives, CD-ROM drives, scanners, or the like. No Ethernet. If you want any of these capabilities, you're talking dock.

Apple offers three docks: the Macintosh Duo Dock, the Macintosh Duo MiniDock, and the Macintosh Duo Floppy Adapter. The Duo Dock ($1,079) — the big one — contains a SuperDrive (a 1.4-megabyte floppy drive), a bay for a hard drive, two NuBus slots, and the standard array of Mac ports (SCSI, video-out, printer, modem, audio-in, audio-out, and ADB). This is the dock for those who want to use their Duos as full-fledged desktop machines. Unlike the other currently shipping docks, which attach to the back of the Duo, the Duo Dock swallows the Duo the way a VCR eats a videocassette. You can even set a 16-inch monitor on top of the Duo Dock without breaking it, but at 13 pounds, it's not the kind of thing you'd want to take on the road.

The Duo MiniDock ($589) contains neither NuBus slots nor an internal hard drive nor floppy drives. But it does provide a full set of standard Mac ports (SCSI, printer, modem, ADB, video-out, audio-in, and audio-out) as well as a port for attaching an external floppy drive. The Duo Floppy Adapter ($135) — if you ask me, it should have been called the MicroDock — offers two ports: an ADB port for attaching a mouse and a connector for attaching a floppy drive. These smaller docks are decidedly more portable than is the Duo Dock.

Apple's design for docking Duos is clever: Duos contain a single 152-pin bus interface — it's really a PDS (processor-direct slot) — that can easily be adapted by third-party vendors, enabling them to endow their docks with a variety of capabilities tailored to specific uses. Although third-party docks have been slow to appear, they finally did early this year. E-Machines began shipping its PowerLinks in January; at press time, RasterOps, Envisio, and Computer Care had all announced docks they expected to ship in March or April.

E-Machines offers two docks: the PowerLink DeskNet ($699) and the PowerLink Presentor ($499). Like Apple's Duo MiniDock, the PowerLink DeskNet is small and lightweight enough to be portable but contains all the ports necessary for basic desktop operation. Its main distinguishing feature is that it offers Ethernet capability: It contains either a 10BASE-T or a thinnet (10BASE-2) connector. None of Apple's docks provides Ethernet directly, nor do any of the

ILLUSTRATION: SUSAN GROSS

competing travel docks. (It is possible to install an Ethernet card in one of the Duo Dock's NuBus slots and you can connect an external SCSI Ethernet adapter to any of the docks that contain a SCSI port, but the DeskNet is the only dock with Ethernet built in.)

The DeskNet lacks an internal floppy or hard drive — like Apple's MiniDock, it has no room for them — but it does provide SCSI and external-floppy-drive ports. It also contains the standard complement of other Macintosh ports, the same as those found on Apple's MiniDock. You do lose a bit in exchange for gaining Ethernet capability, however. The DeskNet provides no way for accessing an internal Duo Express Modem, should you have one installed (although you can attach an *external* modem to the DeskNet's modem port). Apple's MiniDock does allow access to an internal modem.

The E-Machines PowerLink Presentor is designed for maximum flexibility in connecting to external monitors while you're on the road. It can support 12-, 13-, and 16-inch monitors with 8-bit video (256 colors or shades of gray) and one-page portrait monitors and 20-inch monitors with 4-bit video (16 colors or shades of gray). It also supports SVGA monitors (used with DOS machines), NTSC, and PAL monitors. (NTSC is the TV broadcast standard used in the U.S. for television monitors; PAL is the TV broadcast standard used in most of Europe.) By contrast, Apple's MiniDock can support monitors only as large as 16 inches and can drive neither NTSC nor PAL monitors. Special convolution hardware enables the Presentor to display flicker-free images when used with standard TVs.

The Presentor also provides an audio-out port, but because it is designed exclusively for flexible video/audio output — presentations anytime, anywhere — it does not have SCSI or serial ports. It does, however, have ADB and floppy-drive ports, and the modem and serial ports built directly in to the Duo remain accessible when the Presentor is plugged in.

The RasterOps DuoMate is in many ways similar to the E-Machines Presentor. It costs $100 more ($599), but it contains twice as much VRAM (video memory). Therefore it is the only portable dock that can support a 21-inch (1,152 x 870 pixel) monitor with 8-bit video (256 colors). It also supports portrait and 19-inch monitors with 8-bit video, 13- and 16-inch monitors with 16-bit video (thousands of colors), and 12-inch monitors with 24-bit video (millions of colors). Now don't ask me why anyone would want to display 24-bit video on a 12-inch monitor, but for those Duo owners who get the urge, the DuoMate will oblige.

Like the Presentor, the DuoMate can display flicker-free images on NTSC and PAL TVs, but unlike the Presentor, which offers both NTSC and PAL output, the DuoMate requires you to choose one or the other. This is a drawback if your travels (and presentations) routinely take

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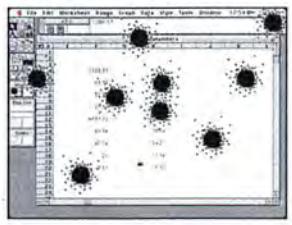
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you between Europe and the U.S. On the plus side, the DuoMate has a chromalock feature, which reduces the color smearing that can occur around text and fine lines and causes black lines to appear to have a red halo on one side and a blue halo on the other.

Envisio and Computer Care have taken the Honey-I-Shrunk-the-Dock approach to making the Duo the ideal portable-presentation Macintosh. Envisio's $595 Dynamic Duo dock is a compact, lightweight (5 ounce) dock for a presentation system that fits the circuitry needed to support a variety of monitors into the space of Apple's Duo Floppy Adapter. The Dynamic Duo can support 16-bit video for monitors smaller than 16 inches, and 8-bit video on 16-inch monitors. It also contains a dual-channel audio-out port. Because it's so small, it leaves the Duo's built-in serial/LocalTalk and RJ-11 ports accessible. An optional, user-installable upgrade enables the Dynamic Duo to support NTSC TVs too. Its price wasn't set at press time, but Envisio said it would be in the $150-to-$200 range.

You've perhaps been wondering when wireless networking will come to the Mac. Well, you've got an answer: now.

Computer Care's BookView Imperial has the same floppy-adapter form factor as the Dynamic Duo and contains one video-out port and one ADB port. Multimedia presenters beware: This means that you can get no sound other than what you can hear from the PowerBook's modest built-in speaker. The BookView Imperial supports 8-bit video (256 colors) for any monitor as large as 16 inches. It also supports SVGA and NTSC monitors, all for $299.

That's the dock lineup as it stands today. But something's wrong with this picture: Have you noticed that most vendors are focusing on the PowerBook Duo as a presentation machine? And have you noticed that none of the docks designed specifically for presentation systems has a SCSI port? Doesn't that strike you as a bit odd? Sure, you can get a 120-megabyte internal hard drive for your Duo, but once you start adding a little QuickTime to your presentations, those 120 megs are going to get eaten up PDQ. All these vendors and a few more are planning to release additional docks this year. Among other goodies in 1993, look for compact video-focused docks that also include SCSI support.

One more thing before I leave this subject: Some vendors are advertising stereo sound for their docks. Don't believe them. Duos don't do stereo. They do dual-channel mono.

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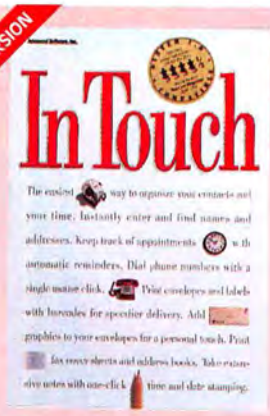


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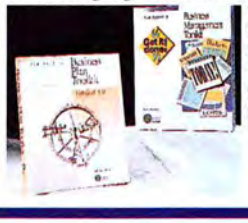
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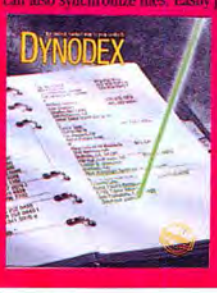
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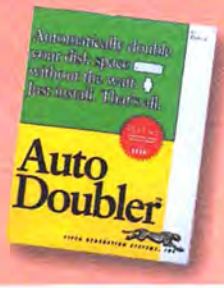


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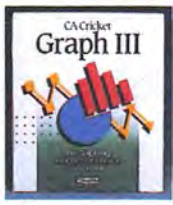
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Battery Technology Inc.
ACC0840 Battery for PowerBook 69.
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SYS0003 At Ease 55.
Caere
UTI0293 OmniPage Direct 269.
UTI0202 OmniPage Professional 549.
Fifth Generations
UTI0324 AutoDoubler 2.0 59.
UTI0179 DiskDoubler 3.7 49.
MAXA Corporation
UTI0337 Snooper Kit 2.0 w/ Free Virex 179.
MicroMat Computer Systems
UTI0285 MacEKG 2.0 89.
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keep, though. You've no doubt been hearing about wireless networking for years. You've perhaps been wondering when it will come to the Mac. Well, you've got an answer: now.

Digital Ocean has announced the Grouper, a spread-spectrum radio transceiver that enables Macintosh computers as far as 250 feet apart to make wireless LocalTalk connections, even through steel-reinforced walls. Designed chiefly for PowerBooks (although it can work with any Mac), the Grouper fits in the space that becomes available underneath a PowerBook when you snap its feet down. The Grouper is scheduled to ship in mid-March.

There are two common methods of spread-spectrum transmission: frequency hopping and DSSC (direct-sequence-spreading coding). Frequency hopping is used by the military in the field to prevent jamming. Because the transmitters are constantly changing frequencies, however, the receivers have to stay on all the time to find out what frequency to listen to next. If everyone's plugged in, that's not so big a problem. But if you want to remain connected while being truly mobile, you don't want to be powering a radio transceiver nonstop from your PowerBook's battery.

Synchronized Swimming

Digital Ocean has solved this problem by using a form of DSSC, which — rather than jumping from one frequency to another — spreads transmitted data out across a wide band of frequencies simultaneously. So Groupers don't need to be on all the time, waiting to find out the next frequency. Instead, when a Grouper joins a network, it synchronizes itself with the other Groupers. Every half a second, they all wake up in unison to check whether anyone has data to transmit. If not, everyone takes another half-second nap. As a result, they use very little power. Another advantage of DSSC is that it compensates well for noisy environments. When transmitted data is spread out across several frequencies at once, special checksums and redundant data are built in to the transmission. That way if the signal encounters interference at one frequency and a bit or two of data is lost, it can usually be reconstructed from data that is received intact on a different frequency.

Groupers aren't cheap. They'll come in at less than $500 a unit, but Digital Ocean wasn't ready to say at press time how much less. Future models will come in different form factors, including smaller models for use with desktop Macs (the current units can be used with a desktop Mac, but they don't have an ideal shape for such use), PCMCIA implementations for Newtons, (possibly) future PowerBooks, and maybe even a Duo Dock model.

Henry Bortman is *MacUser*'s technical director.

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How to Buy

A Multimedia Mac

Creating multimedia presentations is becoming a lot easier — and a little less expensive. Apple's 1991 introduction of the QuickTime dynamic-data format got the ball rolling, and things really got serious with the introduction last year of the IIvx, which has room for three internal storage devices (including a CD-ROM drive), a built-in 32K RAM cache, and a 68030 processor. But you don't have to buy a new Mac to get into multimedia. Adding components to your present setup can give you all the muscle you need.

For further information, see "The Dawn of QuickTime: Video-Digitizing Cards," October '92, page 158.

By Victoria von Biel

☑ Before you buy anything, decide what kind of Mac and monitor your intended audience will use to view your multimedia presentation and how you will deliver the final presentation — on a CD-ROM or a 1.4-megabyte floppy disk or over a server, for example. The answers to both of these questions will determine what elements you need to add to your system.

☑ Make sure your Mac is optimized for speed. You'll need at least 8 megabytes of RAM, and you may need to install a CPU accelerator to cope with the demands of authoring programs. You'll probably also need an accelerated-video card to speed up screen redraw, especially if you'll be using a large monitor and 24-bit color.

☑ If you'll be using QuickTime, your Mac's built-in video or your graphics card should be able to handle 16-bit video. QuickTime is optimized for viewing at this bit depth.

☑ A large monitor makes creating a multimedia project a lot easier. If you are designing a presentation to be viewed on a standard 13-inch monitor, working on a 19-inch monitor will give you extra space to use as a paste-board or palette, letting you keep applications, documents, and other items at hand.

☑ If your presentation has sound or animation, you may need a SyQuest or other removable-media drive. This will make it easier to store and transport the big files that are typically created by multimedia applications.

☑ If you will be delivering presentations on CD-ROM, you will also need a CD-ROM drive to test the finished product before it goes to its intended audience. The new, faster dual-speed CD-ROM drives have a throughput rate of 300K per second, roughly double the previous rate. With the right software, you can also use your CD-ROM drive to play audio CDs and to add sound to presentations.

☑ The Mac's built-in sound is 8-bit, which is fine if all you'll be adding is ambient sound or voice-overs. If you want high-fidelity sound for special effects or music, you'll want 16-bit-audio capability, which you can add to your Mac by using a special NuBus board. Make sure, however, that the software you use supports 16-bit audio — not all software does.

☑ Some accelerated-video cards also include 16-bit audio. For those who are short on slots, this type of card is a good option.

☑ If your Mac came with a microphone, replace it with a better-quality one. Even if you're recording at 8-bit, a good mike will improve the sound quality. For Macs that don't have built-in audio (such as the Mac IIfx, IIci, IIcx, IIx, and II), Macromedia's MacRecorder is a good tool. Some 16-bit-audio boards also add audio input to your Mac.

☑ Of course, you'll need speakers if you want to listen to your presentation. Choose speakers that have built-in amplification; just make sure they're shielded if they'll be placed close to your monitor (otherwise, they'll interfere with the screen image). Any speakers made for use with a computer work fine; good brands include Roland, Bose, Altec Lansing, and Koss. Another option is Media Vision's CDPC LX Mac, which combines speakers, a CD-ROM drive, and a 16-bit-audio board in one package.

☑ If you want to import video from a VCR, videodisc player, or camcorder for use in QuickTime movies, you'll require a video-digitizing card, such as the SuperMac VideoSpigot, RasterOps MediaTime, New Video EyeQ, or Radius VideoVision.

☑ You may need to make a significant investment in software as well as hardware to create effective presentations. In addition to the QuickTime extension, you'll need a presentation program, such as Microsoft's PowerPoint; animation- and sound-editing applications; and multimedia authoring programs, such as Macromedia's MacroMind Director or Adobe Premiere.

POWER TOOLS

Universal spelling: Apple events' real power may finally be put to use, now that Working Software has released Spellswell 7 ($74.95), a spelling checker that incorporates the Apple events Word Services suite, a public protocol that will let any Mac application access separate spelling checkers, grammar checkers, hyphenators, and other utilities that also include the protocol, making them look as though they were built in to the application. This is **good news for users,** who will be able to pick and choose what services they want to add to their applications and will have to learn how to use only one spelling checker. The big guns are already signing on: WordPerfect is building Word Services in to its word processor. 408-423-5696.



Up to speed: If this month's accelerators lab report whetted your appetite for speed, here are a couple of new performance enhancements that are bound to **perk up your Mac.** CD-ROM ToolKit, from FWB (maker of Hard Disk ToolKit), is a $79 utility that includes a universal driver that can mount disks in several formats (including Photo CD). A caching extension speeds up such tasks as opening windows and finding files, and an audio DA lets you play audio CDs from any Macintosh with a built-in microphone. 415-474-8055. ◆ ATTO's Silicon Express 3D ($1,259) is a SCSI-2 accelerator card that lets you place SCSI devices **far away from your Mac** — as far as 25 meters (about 80 feet), which is great for presentations and demos. And the Express 3D does more than break the 6-meter limitation on SCSI-cable length — it also speeds up SCSI transfer rates. 716-688-4259.



All the fixin's: Need a disk-management utility that lets you optimize DOS-formatted disks too? Insignia Solutions' RapidTrak ($99.95) not only formats and partitions your Mac's hard disk but also **formats and optimizes PC hard disks** through Apple's Macintosh PC Exchange or Insignia's own AccessPC. RapidTrak offers password protection for disks or partitions and works with most available drives, including removable-media drives. 415-694-7600.



◆ You can **diagnose your Duo** with Peace of Mind ($149) from Polybus, the first hardware diagnostic tool to support the new PowerBooks, Duos, and Performas and the IIvx. It checks out your Mac's hardware components, including memory, monitors, SCSI devices, processors, keyboard, mouse, modem, and printer. 508-649-7396.



Hyperformance: If you're a dedicated HyperCard user or are moving on up into **Mac multimedia,** check out *HyperPub,* a disk- and print-based quarterly journal of hypermedia products and techniques that's put together by The Prose Lab (*MacUser* columnist Michael Swaine and managing editor Nancy Groth). Future issues will cover hypertext, databases and interfaces, design ideas, and programming style. For $49 a year ($89 for two years), you get more than just news about HyperCard: Every issue includes ready-to-run programs, HyperTalk scripts, and XCMDs on-disk; full printed source code; and beginning and advanced scripting tutorials. 408-459-8564.

By Victoria von Biel

Finer Faxes

By Gregory Wasson

If you have a fax machine, why bother with a fax modem? The main reason is convenience. With a fax modem, you can eliminate some of the tasks — such as printing hard copy, filling out a cover sheet, feeding paper into the fax machine, and dialing (and sometimes redialing) the number — that you must perform when you use a fax machine. Although some dedicated fax machines offer conveniences such as stored numbers, it's hard to beat what a fax modem offers: the ability to fax a document from within the application that created it. The whole process is as easy as choosing Print from the File menu, but here are some tips to help you keep fax costs down and let you fax with finesse.

It pays to shop around when you're making your Mac fax-ready, because the versatility of fax software varies greatly. If you want to receive faxes automatically, find out if the software permits unattended sessions and if it can wake your PowerBook to receive a fax. Ask also whether the software lets you maintain a list of fax numbers or groups so you can send the same fax to multiple locations.

Two of the most flexible fax programs on the market are GlobalFax, from Global Village Communication (415-329-0700), and FAXstf Universal, from STF Technologies (816-463-7972). The GlobalFax software is exceptionally well designed but only comes bundled with Global Village's PowerPort modems. FAXstf ($89; $249 for the network version) is also popular and flexible and works with a variety of fax modems. If you already have a fax modem but don't like the software that came with it, look into FAXstf.

Greg Wasson is the author of *The MacUser Shareware Book.*

Call Waiting

Many people have call waiting on their phone lines. This feature notifies phone users when they have an incoming call and lets them put the current call on hold. Unfortunately, call waiting disrupts modem connections. Data-modem users already know about this, and fax-modem owners should realize that the same problem affects them.

If you're sending a fax and call waiting activates, it will disrupt the fax transmission and possibly freeze up your Macintosh. Fortunately, there's a workaround: Just add a special command to your phone-prefix setting that disables call waiting every time you send a fax. In many cases, this command is *70 or *70W. (The code differs slightly from region to region, so check with your phone company's customer-service department.)

Faux Faxing

If you're a PowerBook user and you always fax documents to an office that has a Mac, a modem, and a printer, you don't need to buy a fax modem or software for either end of the connection. If you purchased your PowerBook when it was bundled with ARA (AppleTalk Remote Access), you can send information by using any fast modem and the ARA software. (You can purchase ARA from Apple for $199.)

Simply install and configure ARA on both Macs. (The Apple licensing agreement for ARA lets you install the software on as many as three Macs you own or operate.) Make sure you have the appropriate printer driver installed on the Mac from which you'll be calling. Connect to the remote Mac, use the Chooser to select the remote printer, and print away.

This scheme is not only convenient, but the output, especially if you're printing to a 300-dpi laser printer, is superior to the generally poor print you'll get from any fax machine on the market. Just take a look at our sample letter's date and address area, which was printed rather than faxed.

A word of warning: Using ARA for this type of faux faxing can be frustrating if you're confined to using a 2,400-bps modem. It's not impossible to do, but you'll probably rack up higher costs in long-distance phone charges. I strongly recommend having a modem with a minimum speed of 9,600 bps when using ARA.

True to Your Type

You can greatly improve fax output by using outline fonts such as Apple's TrueType or Type 1 fonts. With Type 1 fonts, however, it's important that you install ATM (Adobe Type Manager) — it improves print quality considerably, even if you have the appropriate bit maps for the point size you're using. The last paragraph and close of this faxed-letter example are the result of using bit maps only; the opening and first paragraph benefit from the use of ATM (or a TrueType font).

Reading the Fine Print

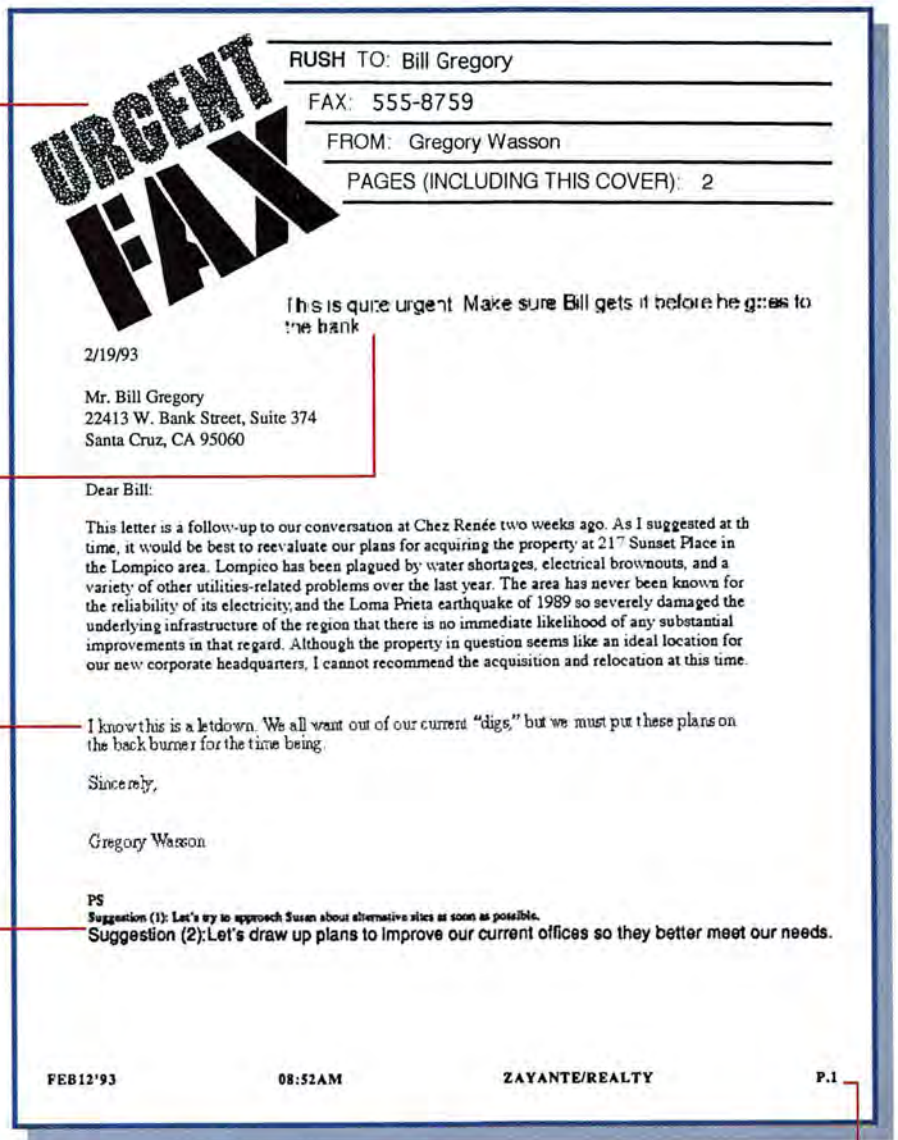
With the growing popularity of OCR (optical character recognition) programs — programs that can read and input scanned text — faxes are increasingly being read by OCR software rather than by human eyes. Unfortunately, the print quality of faxed documents suffers from smudging, broken letters, and light type — the flaws that cause the most problems for OCR applications. Happily, there are some steps you can take to make sure that OCR software can successfully read your faxes: Above all, use the high-resolution or superfine setting of your fax modem's software for documents that will be read by OCR software. If possible, use a sans serif font, as in the second line of this letter's postscript (poor-quality serif fonts tend to confuse OCR applications more than poor-quality sans serif fonts do), and try to make the point size at least 12 points.

If you intend to use OCR on incoming faxes, check out the FaxManager program ($119), from STF Technologies. This program works with FAXstf to convert incoming faxes into editable text. You don't have to process faxes in a separate program — it all happens on the fly. A FaxManager/FAXstf bundle costs $199.

Under Cover

Fancy cover sheets look great. They're usually gussied up with interesting, eye-catching graphics, and you can buy them ready-made and import them into some fax-modem software. Unfortunately, elaborate cover sheets increase fax-transmission times, which is a nuisance if you're in a hurry, and you'll pay more when you use them if you're faxing long distance. Just remember, it's what's *under* the cover sheet that counts, so either avoid cover sheets altogether — which may or may not be advisable depending on who's receiving the fax — or select a plain, text-only cover sheet. Alternatively, you may be able to place the information customarily found on a cover sheet in the header or first paragraph of the document itself.

Avoid using unnecessary graphics in the main body of your document. Graphics increase faxing time.



URGENT FAX

RUSH TO: Bill Gregory

FAX: 555-8759

FROM: Gregory Wasson

PAGES (INCLUDING THIS COVER): 2

This is qure urgent Make sure Bill gets it before he goes to the bank

2/19/93

Mr. Bill Gregory
22413 W. Bank Street, Suite 374
Santa Cruz, CA 95060

Dear Bill:

This letter is a follow-up to our conversation at Chez Renée two weeks ago. As I suggested at th time, it would be best to reevaluate our plans for acquiring the property at 217 Sunset Place in the Lompico area. Lompico has been plagued by water shortages, electrical brownouts, and a variety of other utilities-related problems over the last year. The area has never been known for the reliability of its electricity; and the Loma Prieta earthquake of 1989 so severely damaged the underlying infrastructure of the region that there is no immediate likelihood of any substantial improvements in that regard. Although the property in question seems like an ideal location for our new corporate headquarters, I cannot recommend the acquisition and relocation at this time.

I know this is a letdown. We all want out of our current "digs," but we must put these plans on the back burner for the time being.

Sincerely,

Gregory Wasson

PS
Suggestion (1): Let's try to approach Susan about alternative sites as soon as possible.
Suggestion (2): Let's draw up plans to improve our current offices so they better meet our needs.

FEB12'93 08:52AM ZAYANTE/REALTY P.1

What's Your Point?

Bump up the point size of your faxed-document text to 12 points or even larger, unless this greatly increases the length of your document. The print quality of faxed documents is usually bad enough without tiny type that the reader must squint to see. You can also enhance output by restricting yourself to sans serif fonts such as Helvetica that do not have decorative strokes. Bold type can sometimes enhance the text's clarity too.

Footers of Clay

You can save paper — and perhaps even help spare a tree — by avoiding footers that contain information such as page numbers or the date. Again and again we've seen faxes come in with less than a full page of text accompanied by a separate page that was spun out to accommodate a footer that carried over from the bottom of the previous page. The savings this tip can bring you in phone charges and possibly paper costs add up over time.

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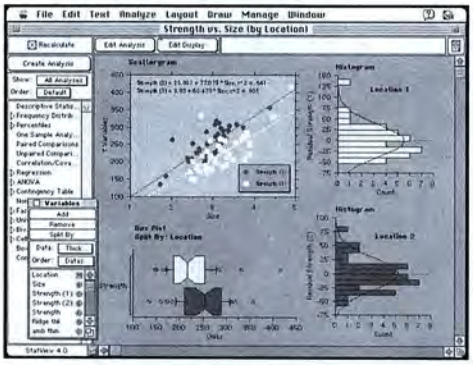
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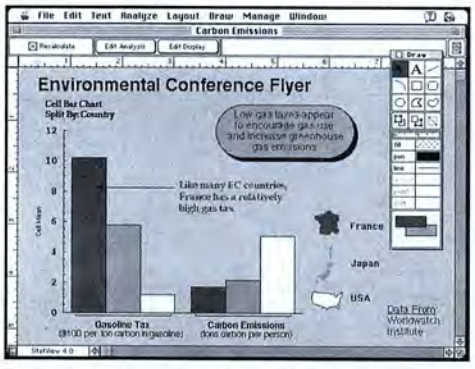
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Enabling Technology



With Apple's system enablers, new CPUs no longer require new versions of system software — but managing multiple models is messier.

By Henry Bortman

Used to be whenever Apple introduced a new CPU, it released a new version of system software to go with it. New processors, new expansion slots, new ports, and other features of the new CPUs required new system software, because previous versions couldn't support them. Sometimes Apple recommended that everyone upgrade to the newest version — 6.0.5 was popular for a while — and sometimes not.

When it announced System 7, Apple promised to reduce the system-software confusion by creating a single version of the operating system that contained a basic set of system-related files common to all Mac models. This basic system could be modified to support one or more new machines by the simple addition of a machine-specific extension called a *system enabler*. Apple finally made good on this promise with System 7.1, the current version of the Macintosh operating system.

System 7.1 initially shipped in October 1992. All System 7 users (not to mention System 6 users) are being encouraged to upgrade to 7.1; Apple claims that 7.1 is now the permanent base system on which such future system features as QuickDraw GX, AOCE (Apple Open Collaboration Environment), and AppleScript will be built. And it claims that until the next "reference" release of system software — expected early in 1994 — all users, including those of new CPU models, will be able to stick with 7.1 — even though Apple is expected to release more than a dozen new Mac models in 1993. For example, when 7.1 shipped, the PowerBook 160 and 180, the Duo 210 and 230, and the Mac IIvx — the first machines to use system enablers — also shipped.

Now, when you casually consider this concept, it seems like a good plan. For example, with the release of the Color Classic, LC III, Centris 610 and 650, Quadra 800, and the PowerBook 165c, in February 1993, System 7.1 was still the reigning version of system software. Under the old system, Apple would have had to release a version 7.1.1 of system software for the new machines and users of all other models would have had to decide whether or not to make the switch. With the system-enabler approach, this wasn't necessary.

But there are some problems. And they're not trivial.

Identity Crisis

The way you install the system enabler required by your machine (if it does require one) is to use an Install Me First (IMF) disk. These disks ship with all new machine models beginning with those released in October 1992. Each Install Me First disk is specific to one or two machines (for example, the same IMF disk works for the PowerBook 160 and 180). When you install system software on a machine that requires a system enabler, you start with the Install Me First disk rather than the Install disk. Install Me First installs the required system enabler (and other machine-specific software, such as

ILLUSTRATION: LIN WILSON

extensions, control panels, and DAs) and then prompts you to insert the Install disk and proceed with the standard System 7.1 installation.

This works fine, as long as you don't lose or damage your Install Me First disk. But let's say you're a PowerBook 180 user out of town on a business trip. If you're like most people, you don't take a set of system disks with you when you travel. You should, but you probably don't. So let's say your PowerBook crashes. Big time. Your System file gets corrupted, and there's no hope for you until you reinstall your system software. If you don't have the Install Me First disk for your particular model, you *can't* reinstall your system software. Your machine won't run if it isn't booted with a disk that contains the appropriate system enabler.

And don't look for a quick fix by borrowing someone else's set of System 7.1 installation disks. Unless they have the same type of Mac as yours, they're not likely to have the Install Me First disk you need. IMF disks don't ship with the System 7 Personal Upgrade Kit or the 7.1 Update Kit — they come only in the boxes of the Mac models with which they're intended to be used.

By implementing system enablers the way it did, Apple has achieved the exact opposite of the effect it was attempting to achieve. It wanted to make a single standard set of system software common to all Macs, but by not including in the basic system-software package the requisite system enablers for all the machines that need them, Apple has actually made standard Mac system software nonstandard.

It gets better.

Guess what the system enablers are called? Let's learn by example. You'd expect the system enabler for the Macintosh PowerBook 160 and 180 to be called something like PB 160/180 System Enabler. Wrong. It's called System Enabler 111. They're all named like that with just a number that, as near as I can figure, might as well have been chosen at random. There is no way to tell by looking at a system-enabler file what machine(s) require(s) it. This was not a smart move on Apple's part.

By the way, don't try to solve this problem by renaming the system-enabler file on your IMF disk as something more meaningful. The Installer is looking for the enabler file by name. If you change the name, you won't be able to install your system.

So what's a user to do? And what is Apple going to do to fix these problems?

Something for Everyone

First, what you should do: If you have a portable (or luggable) Mac that requires a system enabler (such as a PowerBook 160, 165c, or 180; Duo 210 or 230; Color Classic; or LC III), make a copy of the IMF disk that came with your Mac, label it clearly with indelible ink, and carry it with you wherever you tote your computer. You should also be in the habit of traveling with a complete set of system-software disks. The farther you stray from access to someone else's set, the more strictly you should heed this warning. But even those of you who want to live adventurously and don't carry system-software disks should carry an IMF disk.

If you have a transportable Mac that requires a system enabler, make a copy of the Install Me First disk that came with your Mac, label it clearly with indelible ink, and carry it with you wherever you tote your computer.

Second, what Apple's gonna do: It's going to create a "universal" Install Me First (UIMF) disk. The UIMF disk will contain all the system enablers for currently shipping machines, along with all the machine-specific extensions, control panels, and DAs. And it will have installer scripts for all Macs — for those that require system enablers and those that don't. By using the UIMF disk as your starting point for system installations, you won't need to worry about whether or not your Mac needs a system enabler. If it needs one, it will automatically be installed. If it doesn't, the Installer will simply spit out the UIMF disk and ask you for the standard Install disk. A word of caution: The UIMF disk is a high-density disk. Although it contains installer scripts for the Mac Plus and SE, you can't use it in those machines' 800K floppy-disk drives. Fortunately, you don't really need it. You can install system software on those machines by using just the standard 800K 7.1 installer-disk set.

The UIMF disk will be like gold for network managers who have to keep many Macs — in particular, a variety of new-model machines — up and running. It will also be handy for people who, like me, have had occasion to make house calls to friends whose Macintoshes wouldn't work and needed their system freshened up.

And how will you be able to get your hands on this precious, universally enabling disk? Well, you can buy the $499 ten-user System 7.1 MultiPak, which includes the UIMF disk. But that's a bit steep if you're interested only in the one disk. Fortunately, unlike the System 7.1 installation disks, which users are no longer free to make unlimited copies of, the UIMF disk will be freely copyable. At press time, Apple was planning to make it available on-line (for the cost of connect time) on AppleLink and other popular on-line services and possibly also to allow user groups to distribute it. Those of you who don't have access to any of these means can always call the Apple Support Center and try to get it to shake one loose.

Apple, are you listening? Allow me to offer my two cents worth here: Do it. Make it free. Make it easy to get ahold of. I know you want to make money on system software, but this isn't the place to try to rake in a little extra cash.

One last thing. You may be wondering how those who have need of the UIMF disk are going to get updated versions as new Mac models — requiring new system enablers — come out. Apple says it will be diligent in keeping the UIMF disk up-to-date, for inclusion in the MultiPak and for independent distribution. Good plan. Let's hope it's implemented. And here's another good plan: Hows about sending registered owners of the MultiPak a new UIMF disk free whenever the disk is updated? The cost of reproducing and mailing these disks would probably be more than offset by the reduction in tech-support calls that would otherwise have to be handled.

Henry Bortman is *MacUser*'s technical director.

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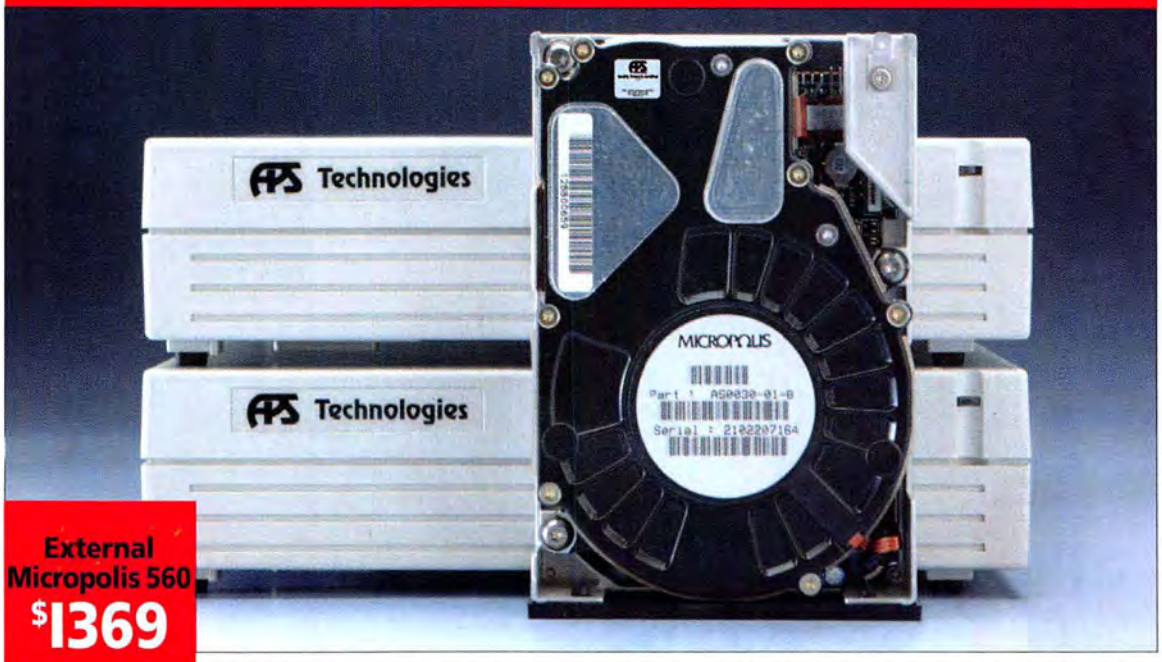
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• **Prices and specifications subject to change without notice. Refused orders subject to restocking fee.**

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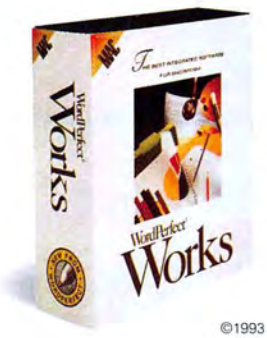
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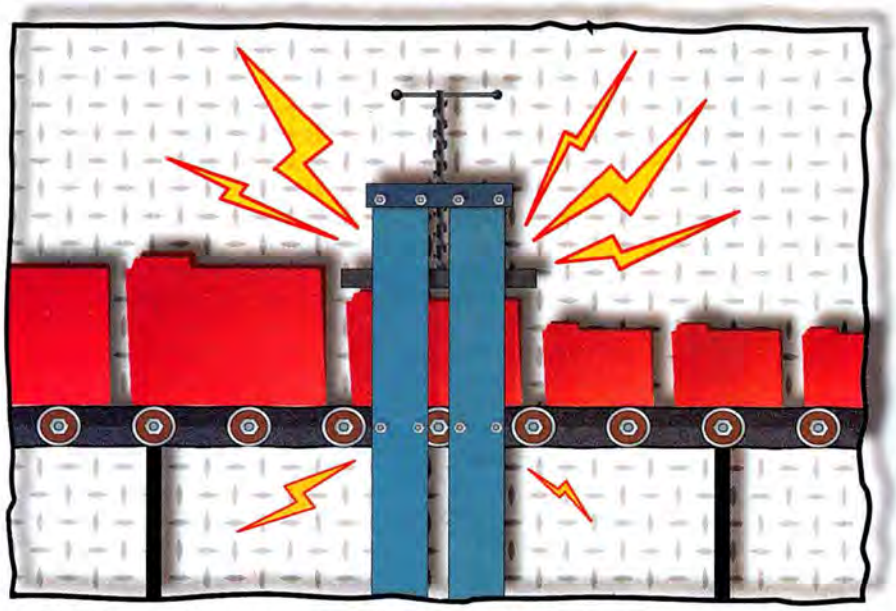
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The Compact Mac



Need more storage space? The new crop of transparent compression programs lets you pack lots more data onto your hard disk for a fraction of the cost of new hardware.

By Adam C. Engst

The topic of file compression — squeezing lots of data into the smallest possible space — always makes me think of those competitions in which hordes of people tried to squeeze into a phone booth. Of course, someone would be hard-pressed to make phone calls while packed sardinelike into a small glass enclosure. Compression, on the other hand, is very useful: It speeds up modem file transfers and increases the effective size of your hard disk, usually without affecting your data's integrity.

Compression is everywhere. It's in your modem, as part of backup programs such as Dantz Development's Retrospect, and in archiving programs such as StuffIt Deluxe and Compact Pro. And as the whole process becomes easier, we're seeing the rise of "transparent" compression programs, which compress and decompress files on the fly and can even compress the entire contents of your hard disk overnight.

Before we look at some of the new transparent compression programs and consider how effective they really are, it's important to understand exactly what happens to a file when it's compressed. There are two types of compression: *lossy,* which disposes of extraneous data during compression, and *lossless,* which retains all data. You generally use the lossy method to compress files that have analog originals, such as pictures, sounds, and videos.

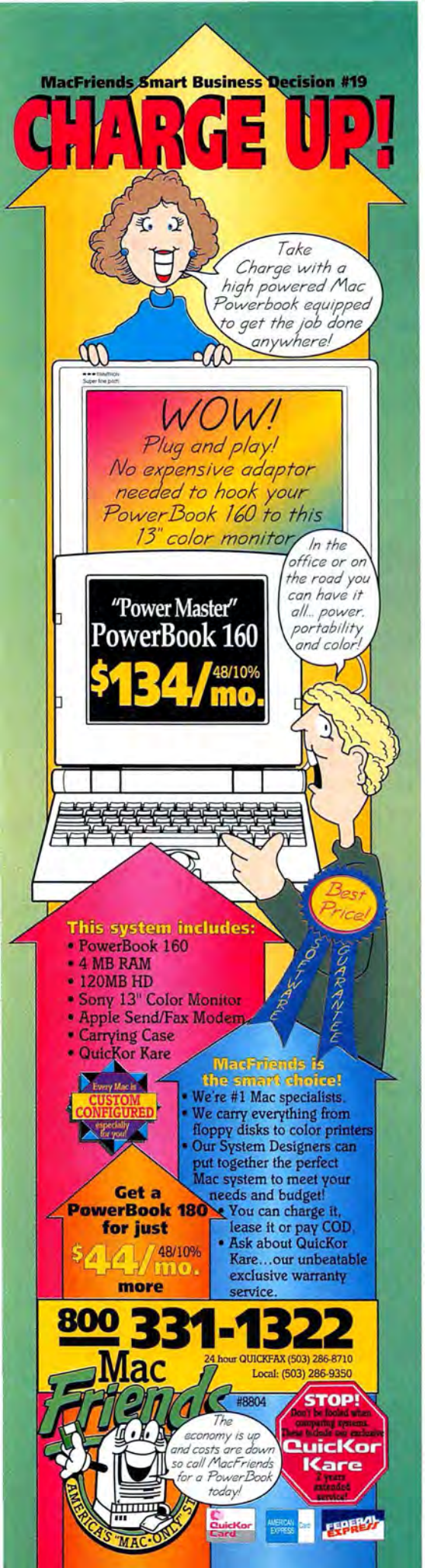
By permanently removing redundant information from files, a lossy compression scheme — QuickTime's Compact Video compressor, for example — can greatly shrink the original, but the quality is reduced. Because using the lossy method on word-processing or database files would result in data loss, lossy compression stays hidden away within programs that deal solely with analog data, programs that can afford to lose a few bits.

Lossless compression programs are far more common and far more generally useful, because they spit out exactly what they take in, and these are the programs we're going to consider here. Because they never remove information, lossless compression programs can't compress data as tightly as lossy compression can. Lossless compression programs look for information patterns within files and substitute small "tokens" for those patterns. The more frequent the pattern, the more tokens the program can substitute, and the longer the pattern, the more space replacing it with a token saves. Files that contain much repetition compress tightly. Databases and large text files compress well, applications usually compress poorly, and already-compressed files, such as StuffIt archives and GIFF-format graphics files, compress so badly that they may get slightly *bigger* if compressed a second time.

A Look Back

The first programs that claimed to be transparent were DiskDoubler ($79.95), originally marketed by Salient but currently sold by Fifth Generation Systems (800-766-7283 or

ILLUSTRATION: MARK W. SWEENEY



BEATING THE SYSTEM

504-291-7221), and SuperDisk ($89), from Alysis (800-825-9747 or 415-566-2263). These programs compress files manually (in DiskDoubler, you use a Finder menu; in SuperDisk, you append *.s* to the filename). Compressing a file changes it so that it is no longer readable by the application used to create it, so DiskDoubler and SuperDisk each perform tricks to fool programs into thinking that compressed files are expanded.

DiskDoubler and SuperDisk are far from perfect: They require too much user interaction to be truly transparent, and because they are extensions, they can create all sorts of difficulties if you start your Mac without the appropriate extension loaded. (Fifth Generation has solved the latter problem by including an application that expands compressed files if the DiskDoubler extension isn't loaded.)

The next generation of compression programs — Fifth Generation's AutoDoubler, Aladdin's SpaceSaver, and Alysis' More Disk Space (MDS) — has solved these problems and added the concept of "idle-time" compression, or the ability to compress many files while the Mac is not being used (see "The Moonlighting Mac," March '93, page 233). Idle-time compression uses an algorithm that trades compression speed for expansion speed. Files compress slowly (when you're not working, so who cares) but expand quickly when opened.

Smaller Is Better

All three programs have similar features, including exception lists for documents that shouldn't be compressed as well as lists of applications (such as backup and communications programs) that need to know if files are compressed. These similarities complicate deciding which one might be best for your needs, so here are some pointers for distinguishing among them.

AutoDoubler. Fifth Generation designed AutoDoubler ($89.95) with idle-time compression capabilities to complement DiskDoubler, which enables you to create self-extracting archives and lets you split a large file across several floppy disks. AutoDoubler also includes AutoDoubler Internal Compressor, a bundled application with which you can manually compress applications and extensions at the resource level, which lets you compress items in the System Folder. (AutoDoubler does not automatically compress such files, because it's not safe to compress anything in the System Folder that might need to be accessed before the expansion extension loads.)

A separate extension, CopyDoubler, makes sure that compressed files are not expanded when they're copied or duplicated. CopyDoubler also speeds up the copying of uncompressed files and the emptying of the Trash.

SpaceSaver. Aladdin Software (408-761-6200), which makes the venerable archiving program StuffIt Deluxe, has entered the transparent-compression market with SpaceSaver ($59.95). Although you can buy the SpaceSaver extension as a separate product, a better deal is to buy it bundled with StuffIt Deluxe 3.0 ($120). StuffIt Deluxe is the most powerful and flexible archiving program available, and it includes lots of extra utilities that let you expand files that have been compressed with other programs. Should you need to boot without extensions, you may want to avail yourself of StuffIt Deluxe's ability to expand SpaceSaver files.

SpaceSaver's neatest feature is that it lets you compress a file or folder or exclude it from being compressed simply by adding your own keyword to the beginning or end of the filename. You can also create or expand an archive by adding or removing the suffix *.sit* or, for self-extracting archives, *.sea.*

Unlike AutoDoubler and MDS, the current version of SpaceSaver cannot compress applications and extensions at the resource level, which means that you can't compress items in the System Folder. And SpaceSaver's definition of idle time doesn't account for serial-port use, so SpaceSaver may slow down the modem-communications process (important if you download files from an online service). SpaceSaver expands files to disk — unlike AutoDoubler, which generally expands files into memory and expands them to disk only if you modify them — so it may be slower.

More Disk Space. Unlike AutoDoubler and SpaceSaver, which are extensions, MDS is an application with some companion resources (required for expanding files) that are installed in your System file rather than loaded as extensions at startup. Although this prevents you from booting without loading the MDS expansion code, it doesn't prevent you from booting with a floppy disk, another hard disk, or a removable medium. But because MDS, like SuperDisk, does not change file types, booting with

a disk that doesn't contain the MDS expansion code means that you won't be able to open compressed files. In addition, many people are uncomfortable with programs that modify the System file and therefore complicate tracking down conflicts with other programs and extensions.

The MDS application itself handles compression, so you must start it manually or place it in your Startup Items folder. As a result, MDS requires more user interaction than does AutoDoubler or SpaceSaver.

Driver-Level Compression

Golden Triangle (619-279-2100) and Stac Electronics (619-431-7474), a major player in the PC compression market, have a new way to save disk space. Each integrates compression into the disk driver, the low-level code that mediates between the operating system and the hard drive. Golden Triangle's TimesTwo ($149) and Stac's Stacker for Macintosh ($150) promise complete transparency, because the driver compresses when writing to and expands when reading from the disk.

In the version that was shipping at press time, TimesTwo didn't offer partitioning or security features, which Golden Triangle thought would get in the way of complete transparency (the company claims that these features will be in future versions, though). Stacker for Macintosh works with your existing driver, however, which lets you retain partitioning and security features and might possibly reduce incompatibilities with security programs.

Despite the real advantages in terms of transparency and ease of use, I don't think that very many users will switch immediately from more-conventional compression programs to driver-level compression. Because driver-level compression ensures that files copied to other disks will always be expanded, you lose the ability to pass compressed files to your backup program or external storage. Security software can cause some problems with TimesTwo, and encrypted data may trouble Stacker. In the unlikely event that the driver is damaged, you'll need disk-recovery software that realizes that the volume is compressed and warns you to reinstall the driver. Older versions of some recovery software may try to write an emergency driver that cannot expand compressed data; in that worst-case scenario, you'll lose all your files. Finally, you have no control at all over what is compressed with these programs, although Stacker can "UnStack" (or decompress) your disk if you wish.

The important issues in transparent-compression software are reliability, speed, features, and transparency. The driver-level compression packages win the transparency contest, but they're so new on the Mac that they have yet to win over many users. Watch for *MacUser* test results in upcoming issues.

Adam C. Engst is the editor of the free weekly electronic newsletter TidBITS. You can contact him via E-mail on CompuServe at 72511,306.

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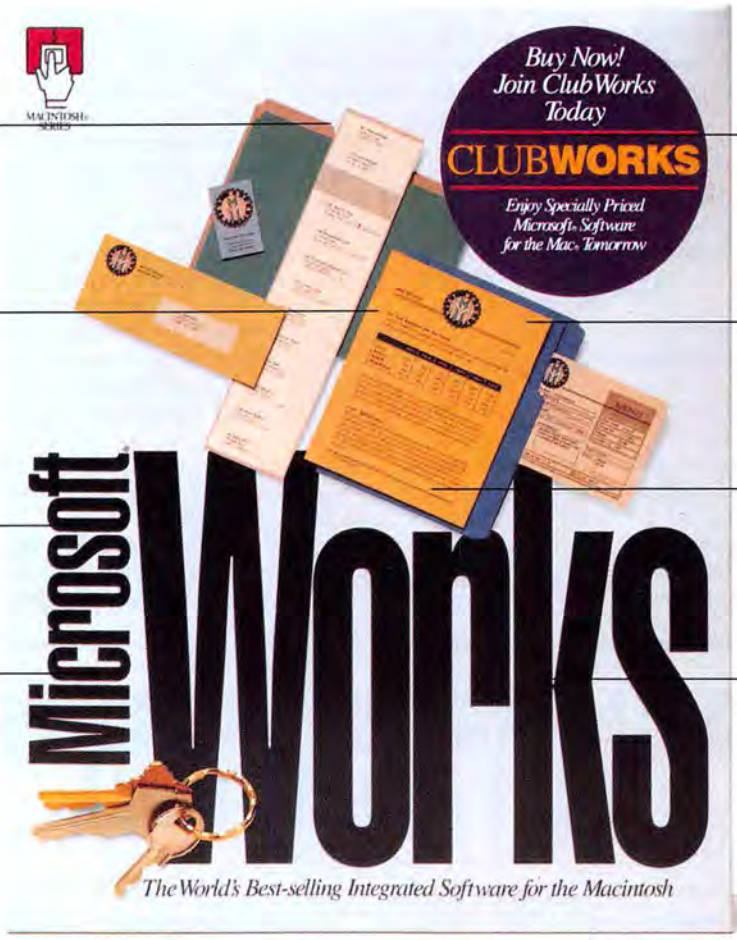
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How to Repackage Any Mac

If you can't justify the expense of moving up to a more powerful Mac — or if you have special needs that an off-the-shelf Mac can't meet — you may have been tempted by ads for companies that not only upgrade your current Mac to make it faster and more powerful but also repackage it in a new case. The savings can be significant, but repackaging has its disadvantages too: It may be harder to sell your Mac if it isn't in its original case, and you may have trouble finding a technician to do needed repairs. (Always check whether a warranty is offered!) Here's a brief look at your options.

By Bob Brant

Repackaging your Mac usually means having its logic board placed in **a new case,** which may include upgrades such as a new power supply, accelerator card, video card, or monitor. The case you choose can range from compact to tower to specialized rack-mount.

For **the Mac Plus, SE, or SE/30,** MicroMac (27111 Aliso Creek Road, Suite 145, Aliso Viejo, CA 92656; 714-362-1000) offers the MicroMac Upgrade System, which lets you incrementally upgrade and repackage your Mac as your needs change. You can start by adding a 25-megahertz 68030 accelerator to your Plus or SE for $299; later, for $699, you can repackage your Mac into an LC-sized small-footprint enclosure with a 15-inch full-page monochrome monitor. (SE/30 owners can get a similar package for $599, plus $299 for the full-page display — or add another $100 for an 8-bit video card and $379 for a 14-inch color display.) You can have MicroMac repackage your Mac ($65) or do it yourself with a screwdriver. (MicroMac's assembly instructions are clearly written, and the company's support is good.)

Sonnet and DGR each offer repackaging solutions for **the LC.** The TwinSlot LC ($549) from Sonnet (18004 Sky Park Circle, Suite 260, Irvine, CA 92714; 714-261-2800) provides a larger replacement power supply, allows half-height 3.5-inch hard drives, and adds two PDSs (processor-direct slots). The Max chassis ($349) for the LC or Performa 400, from DGR (1219 West 6th Street, Suite 205, Austin, TX 78703; 800-235-9748 or 512-476-9855), features a supplemental 40-watt power supply, room for a second hard drive, and two extra PDSs.

For **the Mac II family,** Atlanta Technical Specialists (3731 Northcrest Road, Suite 31, Atlanta, GA 30340; 404-455-6225) offers the $495 Tower of Power, a 9-bay case with a 300-watt power supply, which lets you turn any Mac II model into a server or workstation platform. All you need are a screwdriver and ATS' excellent instructions and support (or ATS will do the installation). You add floppy and hard drives, a keyboard, mouse, and your choice of video cards and monitors. ATS recently announced a 12-bay, 400-watt tower for Quadra 700 logic boards for $795 as well as a model that will accommodate Quadra 950 boards.

For those who need a Mac that can take some **hard knocks** (in a lab, factory, or mobile unit), GreenSpring Computers (1204 O'Brien Drive, Menlo Park, CA 94025; 415-327-1200) buys Macs from Apple (or gets them from you) and repackages them into all-steel, 19-inch, rack-mounted slide cases with extra cooling, air filtration, shock and vibration isolation, and an industrial-strength circuit breaker. GreenSpring's RackMac models start at $3,995 for a repackaged LC with a 1.4-megabyte floppy drive, 40-megabyte hard drive, 14-inch color monitor, keyboard, and 4 megabytes of RAM. RackMac Quadra 700s start at $7,795.

Business Technology Manufacturing (42-20 235th Street, Douglaston, NY 11363; 718-229-8080) repackages several Mac models; Sixty Eight Thousand (160 Technology Circle, Scotts Valley, CA 95066; 408-438-1777) repackages the IIfx; and Specialized Computer Systems **"ruggedizes"** Macs (4016 Quartz Drive, Santa Rosa, CA 95405; 707-539-9003).

Table 1: Is It Worth It to Repackage an SE?

Upgrade	Pros	Cons	Cost
MicroMac upgrade	Has video card, accelerator, and PMMU.	Can't go back to original configuration.	$998
Connectix's Virtual	As much as 16 MB of RAM.		$80
4 MB or more of RAM	Can use faster SIMMs than standard SE.		$140 and up
Bigger hard drive	More storage space.		$200 and up
Total cost of repackaging			$1,418 and up
LC II 4/40 with Apple 13-inch color monitor	Color monitor. Official Apple product.	Slower CPU. Small display area.	$1,738
LC II 4/40 with Apple 15-inch full-page display	Monochrome portrait display.	High cost.	$2,338

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- Perfect for DTP & CAD/CAM
- Includes 8 Bit video interface

Trinitron 19" Color ..$1898

Full Page Display.....$398

Monitors for all Budgets



20" Sampo Color System
- With 8 Bit interface$1298
- With 24 Bit interface$1998

20" Sampo Mono Grey Scale
- With Mono interface.....$698
- With Grey Scale interface$998

14" Sampo Color.....$378

19" Trinitron System
- With 8 Bit interface$1898
- With 24 Bit interface$2898

NuDesign Full PageDisplay
- Grey Scale for CI, SI, Quadra$398
- II, IIfx, FX, SE30, 1Bit.....$488

14" SONY Trinitron.....$428

16" SONY Trinitron.....$1098

Optical Drives & CD ROM



NuDesign 3.5" 128mb Optical.....$998
- MacWorlds Editors Choice! Nov. '92

Ricoh 600mb HyperSpace.....$2898

Toshiba 3301CD ROM Player$538



NuDesign DAT & Optical Drives

NuDesign 2.1 Gig DAT

With Retrospect$1098.00 With SoftBackup.....$998.00

NuDesign 5.0 Gig DAT

With Retrospect$1498.00 With SoftBackup.....$1398.00

NuDesign 3.5" 128mb Optical$998.00

NuDesign 3.5" 256mb Optical$1798.00
- MacWorlds Editors Choice! Nov. '92

Fujitsu Drives

		Internal	External
330 MB	3.5"	$848	$898
425 MB	3.5"	$898	$948
520 MB	3.5"	$948	$998
1.1 Gig	3.5"	$1798	$1898
1.2 Gig	5.25"	$1448	$1498
2.06 Gig	5.25"	$2348	$2448

Toshiba Drives

		Internal	External
1200 MB	3.5"	$1598	$1648
877 MB	3.5"	$1198	$1298

Conner Drives

		Internal	External
C 42 MB	3.5"	$198	$248
C 85 MB	3.5"	$228	$288
C 120 MB	3.5"	$288	$348
C 170 MB	3.5"	$318	$388
C 212 MB	3.5"	$438	$498
C 540 MB	3.5"	$988	$1048

Syquest Drives

44MB Removable ...$448.00

88MB Removable ...$598.00

Scanners

Umax UC-630
With *PhotoShop*.....$1098.00

Umax UC-840
With *PhotoShop*.....$1248.00
Transparency/Slide Scanner Option.....$728.00
Automatic Document Feeder$498.00

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Transparency/Slide Scanner Option.....$798.00

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TIP SHEET



Nobody ever said you had to live in Cupertino to be a Macintosh expert. Know-it-alls are everywhere, from Manhattan to Malibu — even in Waldport, Oregon, where we found our own Mac guru, Philip Russell. Each month Phil shares his own tips plus the best of the 70-odd Macintosh-user-group (MUG) magazines he reads each month. But Phil can't do it alone. To those whose undocumented Mac tip *MacUser* prints, we pay $25, and the Reader Tip of the Month earns $100.



Send your tip, together with your name, address, and phone number, to Tip Sheet, c/o *MacUser*, 950 Tower Lane, 18th Floor, Foster City, CA 94404. You can also contribute tips electronically via ZiffNet/Mac, the on-line service for *MacUser*. Send



them to Gregory Wasson at 72511,36. Be sure to include your full name and mailing address along with the text of the tip.

By Philip Russell

Reader tips compiled by Gregory Wasson

■ Whenever you use an overhead-projection screen to make a Mac presentation, turn the Mac around so that you face the audience. That way you can use the Mac screen for reference. Too many presenters work with their backs to the audience, looking at the projected image.

■ Need a mouse pad in a pinch? I use a vinyl cover torn from a three-ring binder. The Newfoundland (Canada) MUG suggests a laminated place mat. Whatever you use, make sure it's smooth — some conventional mouse pads slough off lint, which rapidly messes up your mouse.

■ For those who fax documents often, Adobe says, Lucida Roman and Lucida Sans are the best fonts to use. Next come Stone Sans and Corona and then Bookman Light.

■ Keep PageMaker's dictionaries in the System Folder, and PageMaker will open a bit faster. If you've been keeping them in the PageMaker folder (they also work from there), you might put an empty folder into the PageMaker folder and name it with the reminder that the dictionaries are in the System Folder.

■ If you have an ImageWriter and haven't solved the first-page-jam problem, here's one solution: Leave the paper hanging in the section of the printer containing the tractor feed (before it enters the roller). When you turn on the ImageWriter, press the form-feed button, and you are off and running with no problems. Paper curl causes most jams, and if the paper isn't left rolled part of the way around the roller, it doesn't get curled.

■ Here is a little exercise in making PageMaker files as small as possible without actually compressing them. I started with a 48K PageMaker document. First I used the Save As command to save it; the resulting file thinned down to 34K. Then I opened the new file, copied it, and pasted it into the Scrapbook. I opened a new PageMaker document and placed the Scrapbook page in order to get a document that was then only 26K. With very large files, your savings will frequently be far more dramatic — as much as 20 percent of the size of the original file.

■ Can you manually run paper shorter than 11 inches in your LaserWriter? Yes, if it is at least 5.5 inches long so that both sets of LaserWriter rollers can grab the paper at the same time and guide it straight through.

■ If you've ever wondered why people use two hyphens in place of a dash, it's usually because they aren't aware that the Mac lets you create both em dashes and en dashes as well as hyphens. The em and en dashes are holdovers from the days of manual typesetting — an em dash is a dash that is as long as the letter *M* is wide and is used mainly to set off parenthetical material. You create it by typing Option-Shift-hyphen. If you use the em dash frequently and have a macro program such as CE Software's QuicKeys, it's worth creating a macro that lets you type it quickly. Command-hyphen works for me. An en dash, which is as long as the letter *N* is wide, is created with Option-hyphen. It's used to indicate range (1990–1993, for example). Consult a style manual for the official rules of when and where to use em and en dashes.

■ One way to test the reliability of your new Mac is to leave it on for the first 30 days. If anything is going to go wrong, this technique may well reveal it. Some Mac users leave their Macs on all the time anyway. I am suggesting only the first 30 days. After that you're on your own.

■ If the two Teflon pads on the bottom of your mouse are worn, you may be working too hard. On old-style mice, the front feet can be worn entirely off. A worn mouse takes all the fun out of using a Mac, so see about getting a new one.

■ If your envelopes accordion-pleat when you print them in a LaserWriter II (my old printer never accordion-pleats envelopes — so much for progress), flatten the edges of the envelope beforehand with a pen barrel or something else smooth and hard.

■ If you are making buttons in HyperCard, you have to go to the menu only for the first button you want to make. After that, as long as the button tool is still selected, you can just click and drag any button and a new button will be created. To save some time,

Reader Tip of the Month: QuarkXPress

If you're working on a large QuarkXPress document, say a newspaper-sized page, spell-checking the document is slowed down significantly by Quark's desire to jump to and highlight each questionable word so it can be seen in context. Every time a word not on the current screen comes up, Quark jumps to that word, forcing another screen redraw and costing you several seconds. The solution, provided you can live without seeing body text in context, is to choose the Fit in Window view before spell checking. The constant redraws are eliminated, because every word is already on-screen. The only redraw occurs when the spelling checker moves to another page.

Mike Goheen
Owensboro, KY

pick a button with attributes similar to the button you are about to make.

■ The fastest way to access a card in HyperCard is by referring to it by its ID number.

■ If you have a hand scanner, use the spine of a large phone book as a guide to keep it tracking in a straight line.

■ To use card-by-card animation in HyperCard, paste each new image over the image of the previous card, and move it until it matches the location exactly. Make sure it stays selected, and then cut it, go to the next image, and paste in the cut image. The image will be pasted in the exact location occupied by the image on the previous card.

■ To find repeated occurrences of text in Microsoft Word 5.0 and later, use the Find command for the first instance. Then close the Find dialog box, and use the equal (=) key on the numeric keypad (not the regular keyboard) to find other instances. This method gets the Find dialog box out of the way for you (it doesn't work if the Find dialog box stays open).

■ To format several subheads in Word 5.0, select a subhead and format it. To format other subheads the same way, select the next one and press Command-Y. You can keep formatting this way until you type some other keystroke.

Reader Tips

Laser Printers

I found that my dealer (or Apple?) had set the print-density control (directly above the toner cartridge) on my Personal LaserWriter LS all the way to the right (darkest), which uses the maximum amount of toner. You can save on toner and money by moving the control all the way to the left. It makes no discernible difference in print quality, and you save lots of toner.

Robert Warner
East Hampton, NY

Word 5.0

I often use different languages in the same document, which can make checking spelling a nightmare. In Word 5.0 and later, however, there is a way around this dilemma. Because the foreign languages in a document are normally in italics or even in a different alphabet (such as Greek), you can use the Format option in the Replace dialog box on the Edit menu (Command-H) to change the Greek or italic-styled fonts to hidden characters, which the spelling checker will then ignore. When you've finished checking the English portion of your document, you can simply do another search to remove the hidden formatting. If you normally use hidden text, be sure to first change it to an unusual font or format in addition to hiding it, so you can distinguish it from the other formatted characters. After you've finished checking spelling, change it back to hidden text only.

William Seavey
Chapel Hill, NC

Microsoft Word 5.0 pagination can be frustrating when the font of the text you type does not match the page-number font. To make sure



the body-text font will match the page-number font, choose Preferences from the Tools menu, select Default Font in the dialog box, and select the font that matches your body text. Do this every time you change fonts in the text.

Paul Chang
Chicago, IL

Adobe Photoshop

When you print from a non-PostScript inkjet printer such as an HP DeskWriter C, EPS graphics (color or black-and-white) placed in QuarkXPress or PageMaker do not look crisp, because a 72-dpi preview PICT image is printed instead of a 300-dpi rendering of the PostScript graphic. For a higher-quality printout, open the EPS graphic in Photoshop, which will make a bit-map rendering of the EPS graphic. For best results, choose 300 dpi with anti-aliasing turned off. Save the bit-mapped image of the EPS file as a PICT or TIFF file. Place the PICT or TIFF file instead of the EPS file in your page-layout program. When you print the updated PageMaker or QuarkXPress document, your PICT or TIFF graphics will print at 300 dpi.

Tommy McCall
Palmetto, FL

Get Info (System 7)

If you have the Get Info window open in the Finder for a folder (select the folder and press Command-I), the size of the folder and the modified date and time of the most recent modification will continue updating as you add and remove files and folders. This is a great way to see how many files you can fit onto a floppy disk. (This technique will not work if Calculate Folder Sizes has been turned on in the Views control panel.)

Thomas Vanco
Monmouth Junction, NJ

Norton's Fast Find

If you have a file that's been corrupted or for some reason can't be opened normally, you can use Norton Utilities Fast Find DA to retrieve information from the data fork.

Make sure you know the file's name; then open Fast Find, and have it look for that file. Once the file has been located, select its name in the scrolling window and then click on the View icon (the one with a magnifying glass) to see the file's contents. Place the insertion point anywhere in the scrolling text window, and press Command-A to select all. Copy (Command-C) the contents of the window to the Clipboard, close the window, and paste the contents into a text editor or word processor. You'll have to do some editing and reformatting, but it's better than losing the data.

Donna Zelzer
Green Bay, WI

Key Caps

I work at a printing shop where we have three Macs running all day long. The environment is rather dirty, with ink and copier toner all over. When I clean my keyboard, I don't want to shut down the Mac, so I just turn on the Key Caps DA; then any keys I push during cleaning won't affect anything on the Mac.

Kevin Thayer
Logan, UT



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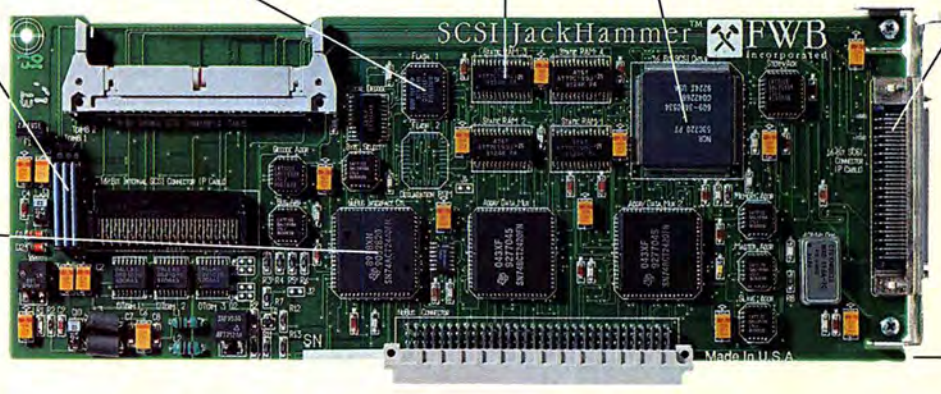
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CIRCLE 84 ON READER SERVICE CARD.

HELP FOLDER



Questions, anyone? Here's where to get answers from the experts. Bob LeVitus is the author of the best-selling *Dr. Macintosh,* second edition. Andy Ihnatko is a longtime activist with BCS•Mac. They're both ready to answer your questions about everything Macintosh.



Write to Help Folder, c/o *MacUser,* 950 Tower Lane, 18th Floor, Foster City, CA 94404. Don't want to wait for an answer? Post your



question on ZiffNet/Mac, *MacUser*'s on-line service, and get a reply from Bob (76004,2076), Andy (72511,204), or one of the other *MacUser* experts. See the masthead in this issue for instructions on how to sign up.

By Bob LeVitus and Andy Ihnatko

Makin' Macrons

Q. I need to know how to create a macron (a line over a vowel) with my word processor. I use this mark frequently when adding transliterations of Chinese, Japanese, and Sanskrit words to manuscripts. At the moment, I'm drawing in macrons by hand; how can I persuade Microsoft Word and my laser printer to produce a macron?

A. Elgin Heinz
San Rafael, CA

Bob: You're in luck. You can easily create macrons to your heart's content by using Word's formula character and overstrike capability.

The secret is Word's formula character, which you access by typing Command-Option-backslash. To overstrike the letter *o* with a dash, type the word up to the character to which you want to add the macron. Then type Command-Option-backslash, followed by the character that will have the macron. Next type an open parenthesis; type the dash you want to use as the macron, followed by a comma and the character that will receive the macron; and then type a close parenthesis (see Figure 1).

Depending on how wide a dash you want, you can create a macron by using a hyphen, an en-dash (Option-hyphen), or an em-dash (Option-Shift-hyphen). After you've typed the formula, select just the dash and format it as superscript (try 7 points for uppercase and 4 points for lowercase) in the Character dialog box (Command-D). Now specify negative line spacing in the Paragraph dialog box. You can store your new macron in Word's glossary for easy access.

You may need to have the Symbol font installed to make this formula work, and you should toggle on Show ¶ (available in two places in Word 5 — on the ribbon above the ruler and on the View menu) or press Command-J to show all hidden characters when you enter the formula. Toggle Show ¶ off to view the formula as it will print.

Andy: All of which goes to prove that Word is probably one of the most powerful and least understood applications. Anyone who ravenously attacks the manual can make Word do the sort of things that will probably

* . . . But Were Afraid to Ask

The human organism has many features that have been, at one time or another, credited for humankind's current position at the top of the food chain: opposable thumbs, for grasping tools and for hitchhiking to warmer climes when an ice age hits; the spoken word, for asking fellow primitives if one can borrow their tools and for saying things like "I swear I just saw that glacier move"; and color vision, which comes in handy when trying to figure out whether that stuff on your chest is from a chest wound or just some A-1 sauce from last night's messy intertribe mixer.

All these merits pale in comparison with the ability that separates us from the elk — namely, our ability to ask questions. So if you're interested in furthering our species, set pen to paper, digits to keyboard, electrostatic charge to paper to toner to fusion roller, and send in your basic questions. To protect you from creatures on the way up the food chain, we'll disguise your identity.

Q. How come, if I tilt my PowerBook 100's screen way up or way down, black and white seem to invert?

Ikemay Ilsonway
Ailmay Opstay, Ewarknay

Andy: It has to do with the nature of your PowerBook's liquid-crystal display (only the 100, 140, and 145 have these particular displays; all other noncolor PowerBooks have active-matrix screens). Remember how back in junior high, your science teacher gave you that demonstration with polarizing filters? Remember those two clear strips of plastic that were transparent when held one way but became completely opaque when one of the strips was given a quarter turn? Good. Hold that thought for a moment while we discuss liquid crystals. These are, as the name suggests, eensy-weensy crystals suspended in a liquid. Pretty dull, until you put the right amount of current through the stuff and all those little crystals twist themselves around in exciting ways so that the pile of glop becomes, in effect, a polarizing filter.

An LCD screen consists of a polarizing filter on top of a sheet of liquid crystal. Normally, that open-faced sandwich is transparent, but when some nifty current is applied to a specific dot on the display, the liquid at that dot acts like a polarizing filter and you get a black dot.

The catch is that when you apply a current to liquid crystal, the current polarizes light when the screen is viewed at some angles but won't polarize it when it is viewed at others. So, when you look at that sandwich from the wrong angle (45 degrees up or down, say), the light that is supposed to be polarized by the liquid crystal streaks through unaffected and the innocent bystander photons that are supposed to be left alone are mercilessly polarized and wind up appearing black.

```
Typing this:  SH\O(¯,O)GUN
Will produce this:  SHŌGUN

Typing this:  Sh\o(¯,o)gun
Will produce this:  Shōgun
```

Figure 1: Creating a macron (a dash across a vowel) is a breeze once you've figured out Word's formula character, a backslash that you create by typing Command-Option-backslash. The top example shows a macron superscripted 7 points above an uppercase character; the bottom example shows a macron superscripted 4 points above a lowercase character.

get you arrested in certain parts of the country. Intuitive as all get-out, wouldn't you say?

Screen-Dump Blues

Q. I used to be able to transfer the picture on my screen directly to my printer just by pressing Command-Shift-4. Now that I've bought a StyleWriter, Command-Shift-4 doesn't work anymore. My Apple dealer told me that the printer was not made to accept that command. Can you tell me why?

Claude Massy
Chateauguay, PQ
Canada

Bob: Your Apple dealer is right. The Print Screen command, Command-Shift-4, is not supported for nonimpact printers (paintjet, inkjet, laser, and other such printers). Your old printer, I suspect, was an impact printer; the StyleWriter is an inkjet printer.

The best you can do without additional software is press Command-Shift-3 to create a screen-dump file on your hard disk. The file will appear at the root level (that is, not in a folder) on your startup disk and will be called Screen 0 under System 6 and Picture 1 under System 7. Open this file with a graphics program — DeskDraw, DeskPaint, Canvas, SuperPaint, or Photoshop, for example — that can open PICT or MacPaint files. (Under System 7, you can also use TeachText to open your screen shot.) Now print.

I create a lot of screen dumps by using ScreenShot ($59.95), from Baseline Publishing (800-926-9677 or 901-682-9676). It is much more flexible than the Mac's built-in screen capture; with it you can capture the entire screen, just a portion of the screen, a single window, or any menu, and you can print what you capture directly from the screen. If you don't want to print it immediately, you can send your screen capture to the Clipboard; save it as a PICT, paint, or Startup Screen file; or add it to your Scrapbook. If you use many screen dumps, ScreenShot — or another commercial product such as Mainstay's Capture or Wildflower Software's SnapJot — is essential.

Andy: If your tastes run more toward Budweiser than Moët, try out Nobu Toge's shareware program Flash-It (available from on-line services and user groups; download FLASH.SIT from Library 3 of the Download & Support Forum of *MacUser*'s on-line service, ZiffNet/Mac).

Flash-It is a control panel that performs the core duty of ScreenShot and other similar programs, but it costs a lot less (and requires less memory to work). Flash-It also lets you print a screen shot with one keystroke, using whatever printer you've selected in the Chooser.

Pins and Needless

Q. Do you know of a source for PowerBook SCSI cables that are longer than the standard Apple offering? The ones I'm using now are so short that I have to place my hard drives behind my PowerBook, which is a big nuisance when I have to switch cartridges in my Bernoulli drive!

Nick Spears
Franklin, MA

Andy: Man, that bugged me too. I don't know of anyone selling SCSI cables that are longer than Apple's, but you can make one easily enough. Buy yourself a standard docking cable (the one designed for mounting your PowerBook's internal hard disk as a SCSI volume on your desktop Mac), and with a pair of needle-nose pliers, a firm grip, and the utmost caution, remove pin 30 from the PowerBook end of the cable. If you're looking into the end of the cable with the SCSI logo and the retaining clip on the top, then pin 30 is the bottommost, rightmost pin in the connector. Give it a firm, slow pull, and the pin should just slide out like a loose tooth.

Very important (that is, you can fry your hardware if you don't read this paragraph): Make sure you don't bend any pins out of place during this process. If everything doesn't look all nice and square, straighten the pins carefully. Otherwise, some of the pins might contact the wrong connectors in your PowerBook and send your portable pal to its Great Reward.

Removing that pin effectively transmogrifies a PowerBook docking cable into a PowerBook SCSI cable. Plug a standard peripheral-to-peripheral SCSI cable in to the socket of that newly reborn cable, and you'll have the equivalent of a 3-foot SCSI cable on your hands. I'd be remiss if I didn't point out that, generally speaking, the shorter your SCSI cable is, the fewer problems you'll run into, but I've used this setup for months now and have had no problems.



Figure 2: You can make a PowerBook SCSI cable that is longer than the one Apple offers if you have a steady hand and nerves of steel. *Carefully* remove pin 30 from a standard PowerBook docking cable, and then plug one end of a standard peripheral cable in to the modified cable's socket and the other in to your SCSI device.

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New SAM 3.5 is the toughest barrier against unknown viruses you can buy. It's the only antivirus that scans and detects viruses in compressed files. And the only one that lets you schedule scans in advance. Plus, it's now easy to install and distribute over networks.†

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*Price in U.S. dollars. **Offer price in U.S. dollars, valid in U.S. and Canada only. SAM is a registered trademark of Symantec Corporation. In Canada, call 1-800-465-2266. Everywhere else, call 408-252-3570. † Available for volume purchasers, and with the SAM 3.5 10-pack version. Call 1-800-554-4403 for more information via FAX. Select option #2 and request document #4510. © 1992 Symantec Corporation.

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This Month on ZiffNet/Mac

HOT UTILITY

Can a billionaire Harvard dropout who is responsible for the most obtuse operating system in computerdom be at home working on a Macintosh? Sure, as long as he does Windows. Bill Gates Does Windows is April's foolish utility, a screen saver (you'll need Berkeley System's After Dark to use it) that has Bill washing your Mac's screen as it gathers dust. For those who don't have After Dark, the animation is also available as a QuickTime video.

You can use the control panel to make Bill work harder for you, and there's also a setting that lets you specify the frequency of Bill's most trademarked idiosyncrasy — pushing his glasses up from the bridge of his nose.

Both versions of the Bill Gates Does Windows screen saver are available exclusively on ZiffNet/Mac and, under the membership fee, are available for free for one month. Type GO ZMC:POWERTOOLS until March 25, 1993. After that, you can find the After Dark version as BILLDK.CPT in Library 3 and the QuickTime movie as BILLQT.CPT in Library 4 of the Download & Support Forum (GO ZMC:DOWNTECH).

By Ben Templin

1,001 Tips and Counting

The *MacUser 1,001 Tips* HyperCard stack has been updated for 1993 to include 500 new tips and hints designed to turn novices into power users and power users into experts. The stack, compiled by Erica Kerwien, is available in two versions. One is the complete and unabridged version with tips covering the gamut of Mac topics, from communications and word processing to spreadsheets and multimedia. The other version contains only the material that is new in 1993; this is the stack to get if you downloaded last year's edition. The files are available in Library 7 of the Download & Support Forum. The filename for the complete tips stack is MUTIPS.SEA; the filename for the tip-update stack is MUTPNW.SEA.

Free and Nearly Free Files

Sysop Gregory Wasson presents a sampling of files recently uploaded to ZiffNet/Mac's Download & Support Forum (GO ZMC:DOWNTECH). The filename and library name are in parentheses.

DesignerDraw (DEDRAW.CPT, Library 1) is a drawing program for creating organizational charts, flowcharts, or any structured diagram. The program offers several special features: Text is resized if you resize the text box, line connections remain as you move boxes around, and more. Freeware. 122K.

Empire Master (EMASTE.SEA, Library 1) is a classic, extremely well-executed war and strategy game similar to the commercial games Empire (DOS machines) or Strategic Conquest Plus (Mac). Formerly known as EmpireBuilder, Empire Master now supports color. This limited version has Save disabled. You receive the fully functional version only when you pay the shareware fee. Shareware, $25. 262K.

Frontier Runtime (RUNT.SIT, Library 1) has everything you need to run (but not write) scripts created with UserLand Frontier. Frontier is a scripting system that makes it easy to write utilities that customize and automate the Mac's operating system, file system, and networks as well as integrate the capabilities of Apple-event-aware applications. Requires System 7. Shareware, $25. 277K.

HideAlways 2.01 (HIDEAL.CPT, Library 3) is an update of the popular *MacUser* utility that specifies which application windows are shown and which are hidden. This System 7.1-compatible update works transparently through the System 7 Hide command. Author: Mike Throckmorton. Free, but distribution restricted. 11K.

HyperMovie Player (HMOVIE.CPT, Library 6) is a simple but powerful means of playing QuickTime movies within HyperCard. Fast forward, rewind, loop, advance one frame at a time, and more. Requires System 7; QuickTime; 2 megabytes of RAM; HyperCard 2.1; and a 68020, 68030, or 68040 processor. Shareware, $5. 124K.

Maelstrom (MAELST.SEA, Library 1), an addictive outer-space arcade game, is one of the best Mac shareware games to appear since Solarian. Meteors, alien spacecraft, vortices, and other dangers fly at your ship from all sides. Maelstrom features outstanding color graphics, animation, and sound. Shareware, $15. 580K.

ZiffNet/Mac Tip of the Month: PowerBook Disk Space

With version 2.0 of the CompuServe Information Manager (CIM), users could see the menu icons in color. Unfortunately, the addition of color increased the size of the application by nearly 380K. PowerBook users and others with monochrome Macs may want to delete the color icons in order to save on disk space. The top-level icons are stored in a document called CIM Data File, but don't just throw it away. You can either download a new black-and-white-only version of the data file or use ResEdit to remove the color resources yourself. To use ResEdit (be sure you work on a *copy* of the CIM Data File), delete the following icon resources: icl8, icl4, ics4, ics8, and cicn. Then delete the following PICT resources: 1550, 1551, 1552, 1553, 1554, 2133, 4212, and 4213. This will bring the data file's size down from 387K to a mere 8K.

To download the black-and-white data file, look for ZMLITE.BIN, available in Library 5 of the Download & Support Forum.



Direct Line

For many of you, mail order is your primary means of purchasing Macintosh products and services. That's why MacUser has put together the following special section.

It's what you've been demanding — a convenient place to quickly find the products you need from the vendors you want to buy from. MacUser's Direct Line to products is just one more reason to turn to MacUser for relevant information aimed at the serious user.



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New MacEKG Spots Trouble Before It Strikes!

The Mac used to be a simple machine. It was a 128K write-and-paint-wonderland, the system folder was just a boot-up utility and the applications were limited. It was a computer for the rest of us...

People who bought Macs way back when, circa 1984, paid more than they would have for a stodgy DOS machine, but they didn't mind — they knew the potential of the fun-loving box with the monitor built in and the cute little icons.

They were right. The Mac has grown up, becoming a powerful and mature business tool in its own right. Today, the Mac enjoys a starting role in a variety of businesses, from graphic designers, to CEOs to television producers. The Mac can run spreadsheets with the big boys, produce pro-quality type, 3-D animation and more.

With this amazing growth, the Mac now has some serious responsibilities. It must handle CDEVs, extensions, scanners, viruses, megabyte drives, virtual memory and voice recognition.

That means your Mac must be modified for the way you work — and what type of work you do. And that opens the door for possible problems. Drop an extension into your Mac's system folder and watch the fireworks!...

MacEKG is the most advanced, easiest-to-use system diagnostic program we've seen, helping you prevent problems before they even think about occurring. You can run a series of tests and get immediate, understandable results on what's going on and what's going wrong. MacEKG watches your system with a set of features that used to be available only to Authorized Apple technicians. Moreover, some of the routines included in MacEKG are not available anywhere else.



If EKG detects a substantial decrease in performance, it displays a warning and directs you to the offending part. This is precisely what any technician needs to know to repair a Mac.

Avoid Simple Conflicts And Lethal Failures! Apple has served up a tempting curveball with System 7. It's advantages fulfill many of the promises that the Mac made in the early days. But there's a funny spin, and if you use System 7, you know what we mean.

Let MacEKG handle the technical stuff. It quickly learns your system and performs a carload of tests — everything from logic performance, RAM stability, software compatibility, inventory control, video processing, integrated circuit integrity, media verification and overall system health. It analyzes what it finds and provides you with a "dashboard" of your system, with helpful suggestions on how to improve performance while eliminating the possibility of intermittent system failure.

It can also tell you how to squeeze every bit of performance out of your Mac. For example, did you know that a Mac Plus can outrun a Mac II? It can if the Mac II is loaded with extensions arranged inefficiently. The Mac Plus contains an accelerator and lean system folder. Try it and see...



EKG is highly flexible. Set EKG to automatically run once daily, weekly, or every time your Mac is "on". Run EKG at startup, shutdown or both. Even change when EKG's performance alerts occur.

You'll learn how INITs can degrade your system's performance by up to 2% per extension, and if you're running 3 or 4 of them...well, it adds up.

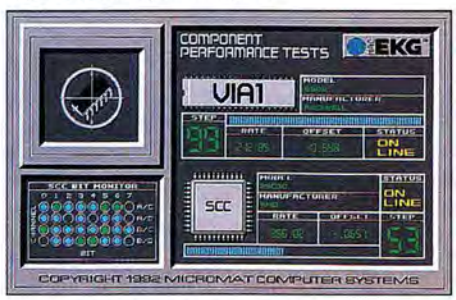
MacEKG knows about performance vs. functionality. It knows the difference between a hardware problem and a software problem. Often, a seemingly unsolvable problem is hidden in some unusual or whiz-bang code in a program, although it shows signs of being a hardware problem. MacEKG could tell you in a second.



Another great MacEKG feature is its ability to "road test" RAM before you actually unleash it on your system.

MacEKG is like having a highly trained technician on a diskette. Although you won't need to know the inner workings of your Mac to get the most from it, you'll find yourself becoming a Mac expert in just a few short sessions. MacEKG is a must for the Mac user who wants a trouble-free, high performance system.

Logic Testing. The first investigation conducted by MacEKG is a logic test. Eight high-level mathematical formulas are performed — MacEKG measures the time it takes to complete them. These math tests check the system's logic which is critical in running your applications properly: direct floating point addition, subtraction and multiplication, if/then loops, trigonometric functions, proportional floating point math, array indexing and square root loop. It sounds complex, but these functions are what make your Mac function — from word processing to high-end graphics. MacEKG makes sure the logic is true; if not, it alerts you to the problem.



MacEKG tests individual hardware components to seek out possible faults — before they become major problems. The VIA (Versatile Interface Adaptor) chips handle all user input like the mouse and keyboard. If allowed to get worse, a faulty VIA can cause complete system shutdown.

RAM Testing. With more complex applications, comes the need for upgrading your RAM. MacEKG tests each bit of RAM twice to verify that all bits of memory are useable. The test is more reliable than the Mac's self-test.

MacEKG registers and samples bits of memory, divides memory into eight blocks and runs each block through a battery of performance tests. If a block tests lower than the others, a "POOR" indicator will appear next to the suspect block and a component warning will be issued. You will see the actual chip that is bad — or about to go bad. MacEKG also tests your system's use of Virtual Memory (if you're running it) and report its performance in the diagnostic report.

PRAM Testing. PRAM (Parameter RAM) provides your Mac with time and date functions and acts as a storage area for keyboard and mouse settings, startup drive, port settings and more. PRAM, like main RAM, must always have power to hold the information it contains.

MacEKG tests this chip with time and loading exercises — repeated 25 times — with times compared. More than 5% difference in these tests issues a "POOR" flag and a component warning is reported at the completion of the diagnostics.

Got an intermittent problem?

For intermittent failures, you need to run Reactivator. It continually tests, powers down and retests until the problem surfaces. This is a heavensent tool for anyone trying to find heat-related problems. (A must for every Mac technician.)





VIA Testing. The VIA (Versatile Interface Adapter) handles your input devices like mouse and keyboard. It also helps in the operation of floppy drives. If there is a faulty VIA, you may experience a number of problems like choppy cursor movement or complete failure of the mouse and keyboard. It can also cause unpredictable and untraceable "freeze" crashes. In extreme cases, it can prevent the Mac from booting and displaying the "Sad Mac" message. MacEKG performs a complete, 100-step test to verify the VIA's accuracy.

SCC Testing. The SCC (Serial Communications Controller) circuit is essential for proper operation of modems, printers and other input/output devices. If your SCC is bad, you'll experience problems in serial communications or floppy drives that only get worse. The SCC test is a 100-step investigation that is updated on the MacEKG screen. This test can be accurately conducted even if a modem is connected to your SCC port.

SCSI Testing. The SCSI chip handles your Mac's high-speed parallel communications for both internal and external devices. These external drives, CD-ROM and other instruments rely on SCSI for smooth operation. Signs of a faulty or inoperable SCSI are poor or repetitive SCSI read/writes or complete inability to communicate with SCSI devices. This chip is often damaged by plugging a damaged cable or device into the port. MacEKG tests the SCSI chip and its individual channels for specific performance and displays the results of its 100-step test on your screen.



RAM is vitally important to the speed of your applications. Not only does MacEKG check that your RAM works, it checks the rate of its performance — then compares it to previous tests. If your RAM is getting slower over time, you know to replace it before it's too late.

MacEKG

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100% Compatible With Every Application. TimesTwo is a snap to install and works with all SCSI and SCSI-2 hard disks, including SyQuest removables, Bernoulli and erasable optical disks, and is fully compatible with all Macintosh applications, including file recovery programs like the Norton Utilities and Central Point's MacTools. A couple of mouse clicks installs the driver on the user's disk. After that, TimesTwo is completely invisible — there's no control panel, system extension or other system software installed on the disk. Go back to work, you're done.

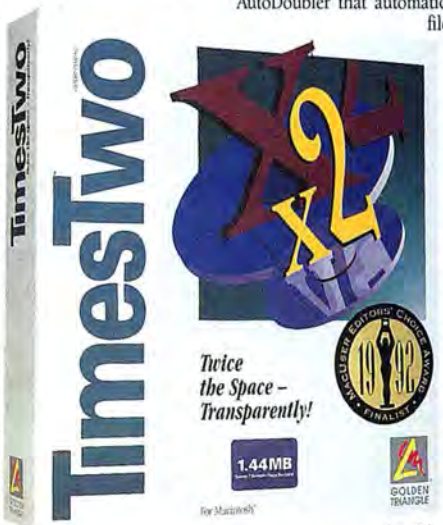
And here's the kicker: TimesTwo is 100% transparent. The user doesn't even have to know it's there. TimesTwo works by compressing disk blocks at the driver level, reducing the amount of space they require, and increasing the true size of the disk. The Finder sees an 80Mb drive — the same drive it used to see as a 40Mb. TimesTwo intercepts files as The Finder requests to load them, and handles all compression and decompression BEFORE The Finder gets the data. To you, everything is normal, with absolutely no slowdown or extra steps — you're unaware of the TimesTwo activity. The only thing you notice is more room.

By operating at such a low level — lower than the level used by application programs — TimesTwo eliminates problems associated with changing files themselves. File icons, sizes and creator types remain the same as they would on a normal Mac, so files can be opened, saved, used, transferred, recognized and recovered just as they would on a normal Mac. You get twice the disk space without any of the problems associated with file compression.

Time-Tested For Reliability. TimesTwo uses the same proven LZS compression technology used in Stacker, the industry-standard disk expansion product for the PC. That means — although TimesTwo's patent-pending technology is a new breakthrough for the Mac — you get years of tried-and-true experience for trouble-free, rock-solid service.

This is a PowerBook owner's dream! Instantly gives you twice the space — turn that 40Mb into an 80Mb without ever touching a screwdriver! Also eliminates the need for cumbersome external drives. For removable disks, media can be moved to another Mac without the need for TimesTwo on the receiving machine. For example, an 88Mb TimesTwo SyQuest cartridge that has been transformed into a 176Mb disk can be sent to a service bureau because the TimesTwo software is already installed on the disk.

Connecting to another Mac with AppleShare and copying files is easy. No file-size guesswork involved. Drag a file from another hard disk to your own — 100Kb there is 100Kb here.



TimesTwo is the trouble-free way to instantly double the size of any hard disk on any Mac.

It's A First — Nothing Else Like It. TimesTwo is the first driver-level disk expansion product for the Mac. No one else has it.

TimesTwo isn't just new, it's a quantum leap beyond such products as AutoDoubler and More Disk Space. Those type of products increase disk storage by compressing individual files, changing creator types and inevitably causing numerous compatibility problems. (So you need to constantly buy upgrades from them.) But TimesTwo is different. TimesTwo works with rock bottom system levels so file sizes and creator types are not changed. That's why file and recovery programs like Norton Utilities and MacTools can go about their business diagnosing and fixing disk problems.

TimesTwo is especially attractive in an era when budgets and resources are tight. System administrators love TimesTwo because of its simple installation and complete transparency to the user. To administrators, adding another hard disk represents not only a significant expense, but also the added difficulty of proper configuration and the security risk posed by external disks. TimesTwo handles all that.

The Old Way: With products like Compact Pro, Stuffit and DiskDoubler, you have to manually select individual files for compression and decompression. Even with products like AutoDoubler that automatically compress and decompress files when they're loaded or saved, you're still working with individual files. You're adding a level of interaction (and complication) between the application program and the Mac operating system. That spells eventual trouble every time.

These type of programs were originally designed not for hard disks — but for modem file transfers. The original purpose was to save money by cutting modem transfer times — shrink the file size and transfer it faster. It was also developed for squeezing files onto floppy disks to save money when distributing applications and files. But it also became popular as a way to increase hard disk storage space.

Here's just some of the reasons why you don't want to do it the old way:

- Compression and decompression requires constant user intervention. It's just more work.
- Files must be decompressed before they can be recognized and used by an application.
- A decompression utility must be included with compressed files for others who don't own the compression product.
- Compressed file sizes don't represent the file's real, useable size. Users have to guess whether they have enough disk space to decompress and use it. (Automatic compression programs attempt to handle this by playing tricks with the Finder, but that makes them highly vulnerable to any new changes in the Mac's operating system.)
- You can't double-click on a file to launch the original application; double-clicking launches the decompression program instead.
- Some compression programs replace the original icon with their own — then you can't tell at a glance what kind of file it is.
- In changing file creator types, compression can falsely trigger virus-detection software — who needs that?
- Compressed files can't be salvaged by file-recovery programs. (In other words, only perfect people who never make mistakes or have equipment can feel safe.)
- Compression programs can't compress the System Folder problems. That means if you have a 20Mb System Folder, that's 10Mb you'll never get to use.
- Constant packing and unpacking of files play havoc with disk fragmentation, so your hard disk and overall performance slow down much more rapidly.

Twice the Space – Transparently!

Feature	Times Two	Auto Doubler	Disk Doubler
Expands Disk to Twice Original Size	■		
Compresses Files		■	■
No Configuration	■		
100% Transparent	■		
Works With All File Recovery Utilities	■		
Changes Icons and Creator Types		■	■
Installs Instantly	■		
Doesn't Require Decompression Utility	■		
100% AppleShare Compatible	■		



TimesTwo — The New Way: Rather than operating on files and placing extra layers of complexity between a program, its files, and the Mac operating system, TimesTwo goes right to the basics. TimesTwo gets down to the disk driver level and doubles the size of the disk. It compresses the disk storage blocks so twice as many fit on the same disk. It's that simple. As a result, the Finder, Mac operating system and all application programs see a disk that's twice as big. Files aren't compressed at all, creator types aren't changed, and users continue to work as they did before.

TimesTwo removes the complexity with:

- No file changes. No guessing about "real" file size to make sure you have enough room to work, and no different creator types that make a file useless to the original application.
- File recovery programs still see the same files they did before, so recovery is no problem.
- No extra level of file manipulation between an application and the Mac operating system. No chance of future incompatibilities if Apple changes things.
- No unpacking utility needed for distributing disks and files, because TimesTwo is already there — inherently on the disk.

TimesTwo is the way to run a hard disk.
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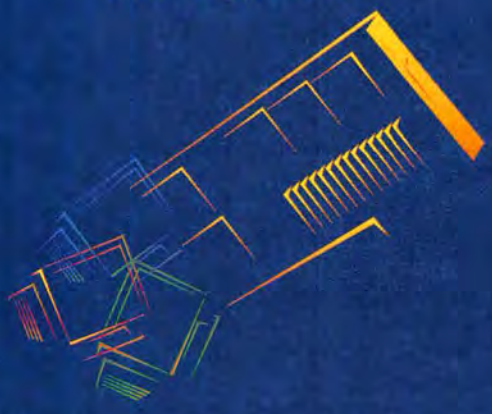
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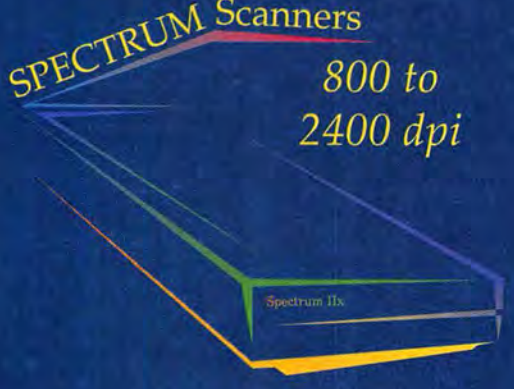
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☐ 01) 1-4 ☐ 02) 5-49 ☐ 03) 50+

2. Your primary job function is: (check one)

☐ 01) Administrative/ General Management
☐ 02) MIS/DP, Communications Systems, Programming
☐ 03) Engineering/R&D
☐ 04) Finance/Accounting
☐ 05) Marketing/Sales
☐ 06) Computer Dealer/VAR

3. For which of the following products are you involved in selecting brands/models to be bought by your company or organization? (check all that apply)

4. Which of the following products have you bought in the last 6 months? (check all that apply)

SOFTWARE	Q3	Q4
Accounting	☐ 01	☐ 01
Spreadsheets	☐ 02	☐ 02
Project Managers	☐ 03	☐ 03
Word Processors	☐ 04	☐ 04
Database Managers	☐ 05	☐ 05
Graphics	☐ 06	☐ 06
Integrated Software	☐ 07	☐ 07
Communications	☐ 08	☐ 08
Utilities	☐ 09	☐ 09

HARDWARE	Q3	Q4
Modems	☐ 10	☐ 10
Scanners	☐ 11	☐ 11
Microcomputer	☐ 12	☐ 12
Printers/Plotters	☐ 13	☐ 13
Monitors/Displays	☐ 14	☐ 14
Storage	☐ 15	☐ 15
Add-in Boards	☐ 16	☐ 16
Networking	☐ 17	☐ 17

5. If so, what function do you serve in the buying process? (check all that apply)

☐ 01) Initiation/ Determine Need
☐ 02) Selection of Brand and Model
☐ 03) Selection of Source
☐ 04) Authorization
☐ 05) Other

6. Over the next 12 months, how much will your organization spend on computer products or services? (check one)

☐ 01) over $5 million
☐ 02) $1 - 5 million
☐ 03) $500,000 - $999,999
☐ 04) $100,000 - $499,999
☐ 05) $50,000 - $99,999
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SyQuest Dual 44/88mb(*One 44&88 Cartridge	$89
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ELS 42mb	19ms	3.5"TH	$179	$239
ELS 85mb	17ms	3.5"TH	$219	$279
ELS 127mb	17ms	3.5"TH	$289	$349
ELS 170mb	17ms	3.5"TH	$319	$379
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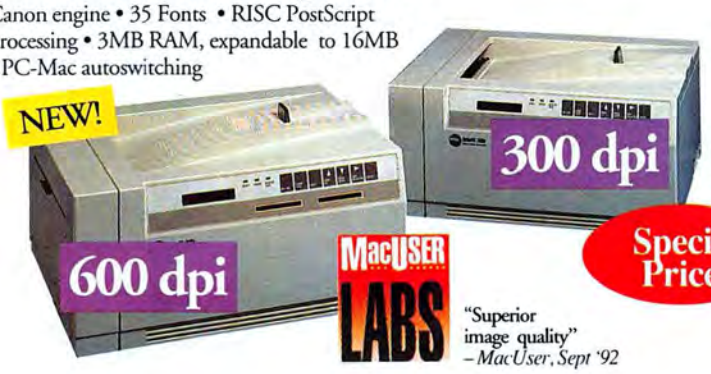
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6098	TypeAlign for ATM	61
8794	Type On Call CD-ROM	56
4145	Premiere	429

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10176	Fetch	199
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Quark

7612	Quark XPress	549

DiVA Corporation 30 day MBG

3011	VideoShop	369

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6740	Stuffit Deluxe	65

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3392	Star Trek Screen Saver	34

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3225	Driveshare 5 Pack	85
1593	Drive 7	49

Dantz 30 day MBG

5255	Retrospect	147
7945	Retrospect Remote	264
3393	Diskfit Pro	72

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8561	911 Utilities	62
2462	Citadel w/ Shredder	62
6978	MVP Bundle	93
4803	Virex	62

Fifth Generation 30 day MBG

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7404	DiskDoubler	45
4838	AutoDoubler	58

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7552	Rapid Track	58
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3606	1-2-3 For Mac	289

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7293	Kid Pix Companion	23
3307	A-Train	39
8298	Where in America's Past is Carmen	35
9059	Arthur's Teacher Trouble	41
5317	Spelunx and the Caves of Mr. Seudo	29
5969	Prince Of Persia	29
8266	SimEarth	40
1910	SimLife	40
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4229	Carmen World Deluxe	29

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2574	MathBlaster Plus	34
3922	Talking Spell-it Plus	28

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3118	Ecology	34
5294	Time Treks	34

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3272	Outnumbered	34

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8316	1 MB SIMM 80ns	(2) 78
2199	1 MB SIMM 80ns	(4) 156
4201	1 MB SIMM for IIfx	(2) 78
7497	1 MB SIMM for IIfx	(4) 156
9437	2 MB SIMM 80ns	(1) 74
7437	4 MB SIMM 80ns	(1) 169
7600	4 MB SIMM 80ns	(4) 675
7599	4 MB SIMM for IIfx	(1) 169
5482	16 MB SIMM for 900	(4) 675
5478	16 MB SIMM for 700	(4) 2499
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9424	4 MB RAM PB 160/180	159
9426	6 MB RAM PB 160/180	229
9427	8 MB RAM PB 160/180	319
9446	10 MB RAM PB 160/180	439
10341	4 MB RAM Duo 210/230	529
10340	8 MB RAM Duo 210/230	239
		447



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1240MB	MXT1240S/8.5MS	$1999	$2079

Maxtor drives feature 150,000 hours MTBF. MXT1240 drive features 300,000 MTBF. Maxtor drives include a two year warranty. Internal full-height drives for the MAC II, IIX, IIFX and Quadra 900/950 only.

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Gigabyte External with Cable	
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1050MB	ST11200N/10MS	$1629	$1699
1352MB	ST41600N/12MS	$1849	$2025
2100MB	ST42400N/11MS	$2749	$2999
2750MB	ST43400N/11MS	$3849	$3999

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SPECIFICATIONS											
25MHz 68030 Optional FPU	25MHz 68030 Optional FPU	33MHz 68030 68882 FPU	25MHz 68030 Optional FPU	33MHz 68030 Optional FPU	16MHz 68030 Optional FPU	25MHz 68030 Optional FPU	20MHz 68030 Optional FPU	25MHz 68030 68882 FPU	33MHz 68030 Optional FPU	25MHz 68040 Built-in FPU	33MHz 68040 Built-in FPU
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127mb	ELS127	17ms	124mb	$295	$355
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FIVE YEAR WARRANTY

FUJITSU

	Unformatted Capacity	Model	Description	Average Access	Actual MAC Capacity	Internal	External
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	1.2GIG	M2266	5.25" Full Height	14.5ms	1029mb	$1475	$1575
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Maxtor

*6300 RPM !!



Unformatted Capacity	Model	Description	Average Access	Actual MAC Capacity	Internal	External
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Maxtor 3.5" Drives carry a ONE Year Warranty. Maxtor 5.25" Drives carry a TWO Year Warranty.

Seagate

Elite Series



Unformatted Capacity	Model	Description		Average Access	Actual MAC Capacity	Internal	External
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2.1GIG	ST42100N	5.25" Full Ht	Wren-9	12.9ms	1900mb	$1935	$2035
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2.4GIG	ST42400N	5.25" Full Ht	Elite-2	11ms	2050mb	$2919	$3019
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Seagate Drives carry a ONE Year Warranty.

CONNER

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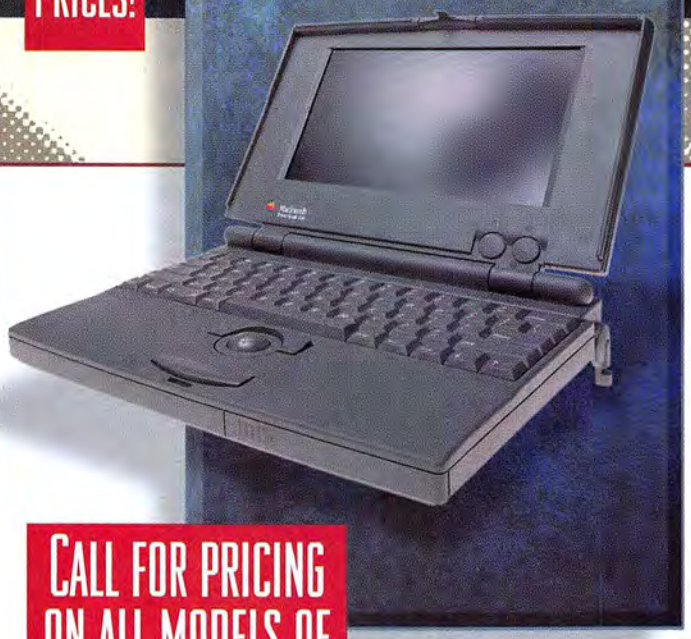
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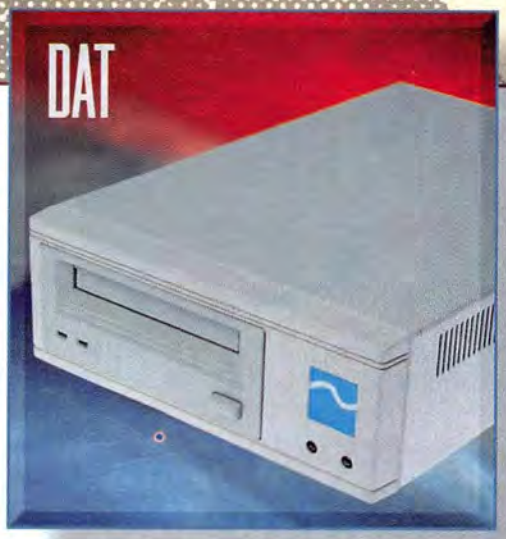
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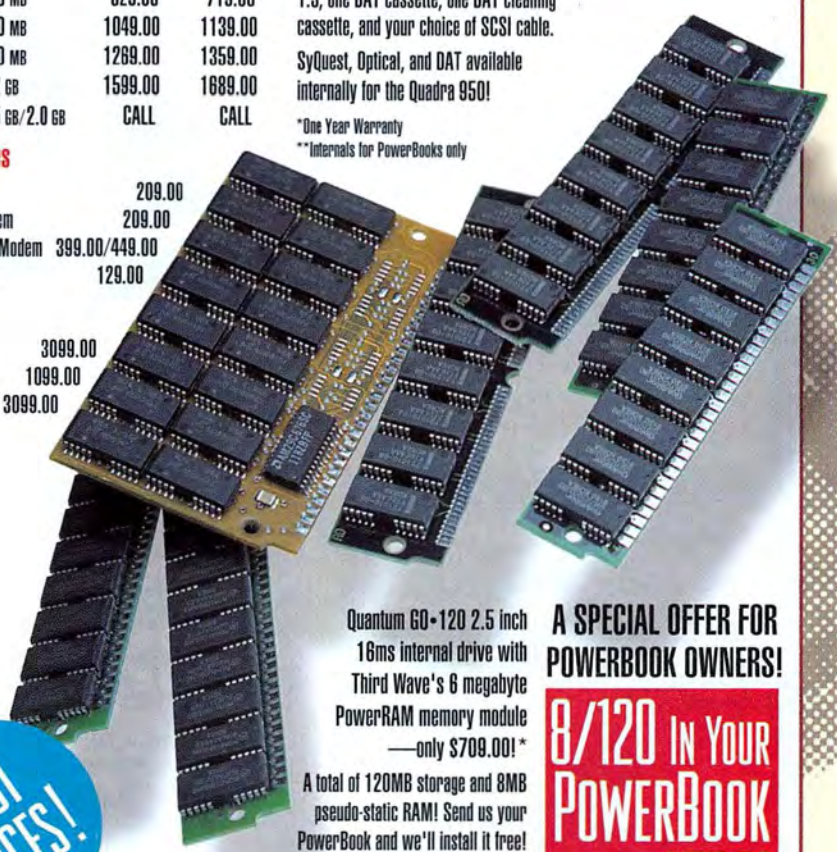
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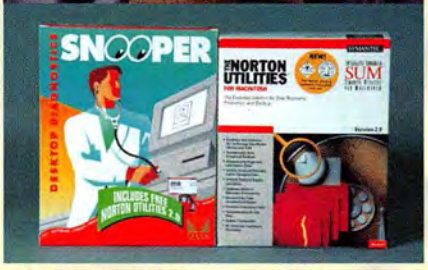
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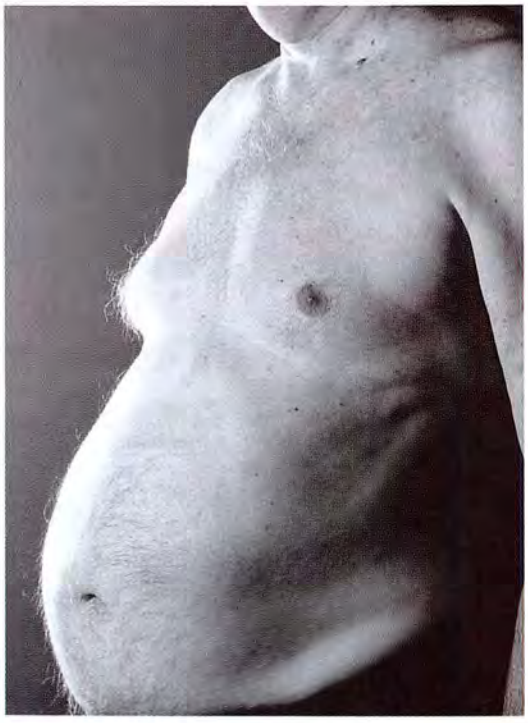
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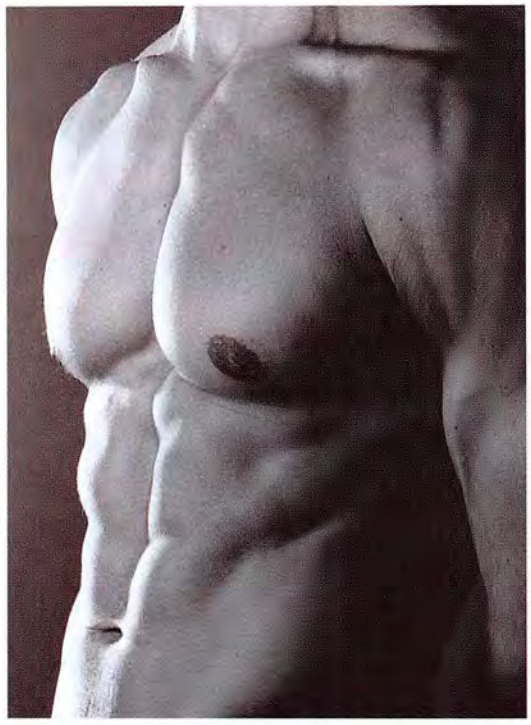
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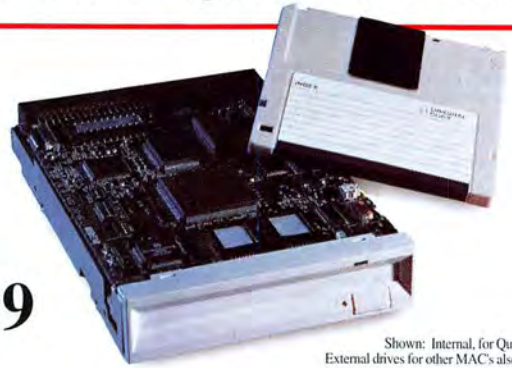
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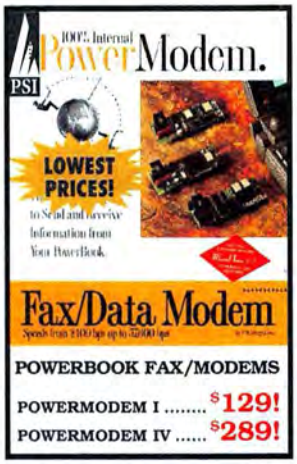
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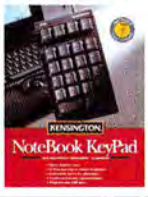
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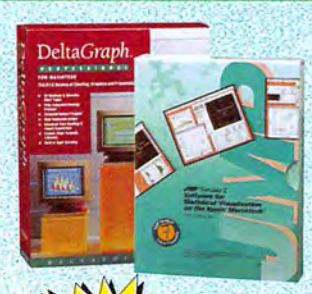


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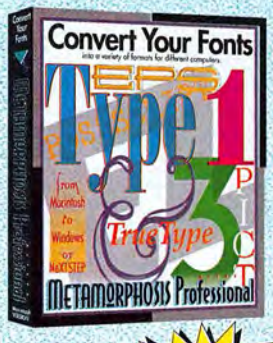
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309-326

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327-329

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Bar Coding		309	
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Communications			
Computer Systems		309	
Data Acquisition			
Data Recovery Services		314	
Disk Drives	305	315	
Diskettes		316	
General	305	316	
Input Devices			
Memory Upgrades		316	
Networking			
Peripherals	305	321	
Power Supplies			
Printers		320	
Scanners	306	322	327
Security			
Tape Drives			
Used Equipment			
Software			
Accounting	306		327
Back Up Systems			
Bar Coding	306	322	
Business	306		327
Business Time Management			
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Recreation			329
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Sales Marketing			
Scientific		325	
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Shareware		325	
Statistics			
Taxes			
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Miscellaneous			
Accessories	308	325	329
Books/Catalogues			
Business Opportunities			
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Data Recovery Services			329
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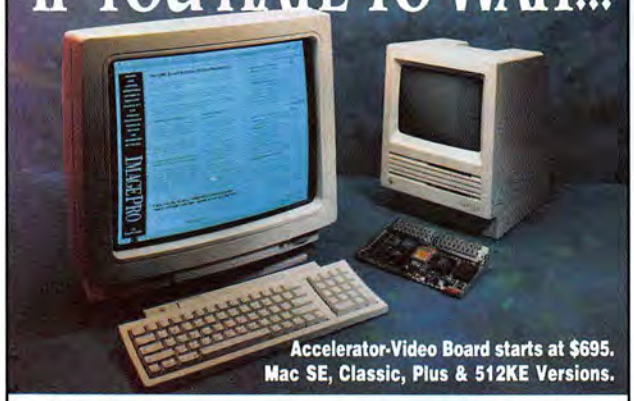
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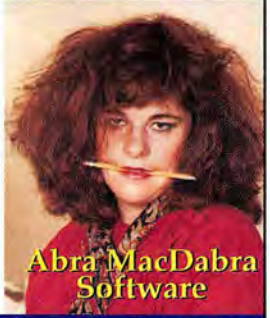
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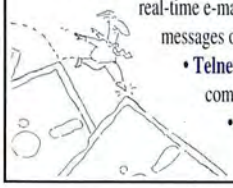
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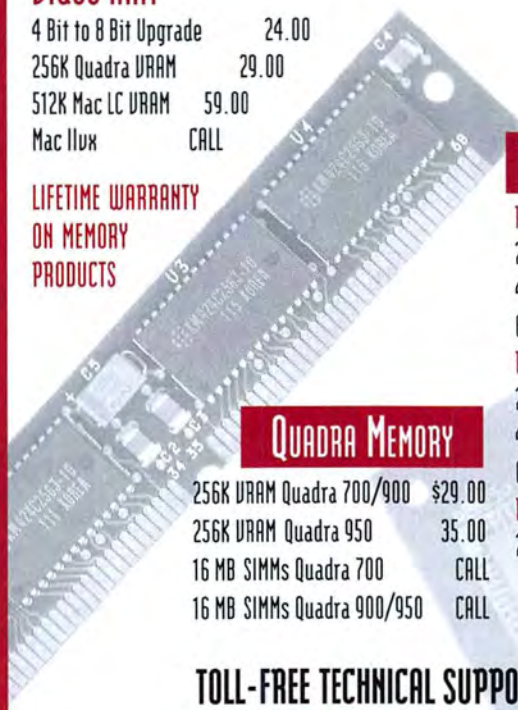
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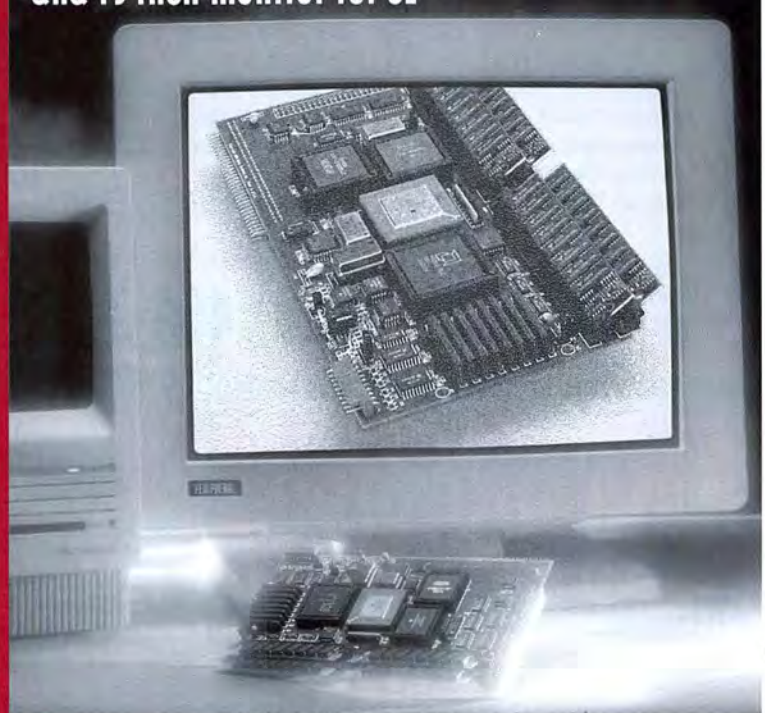
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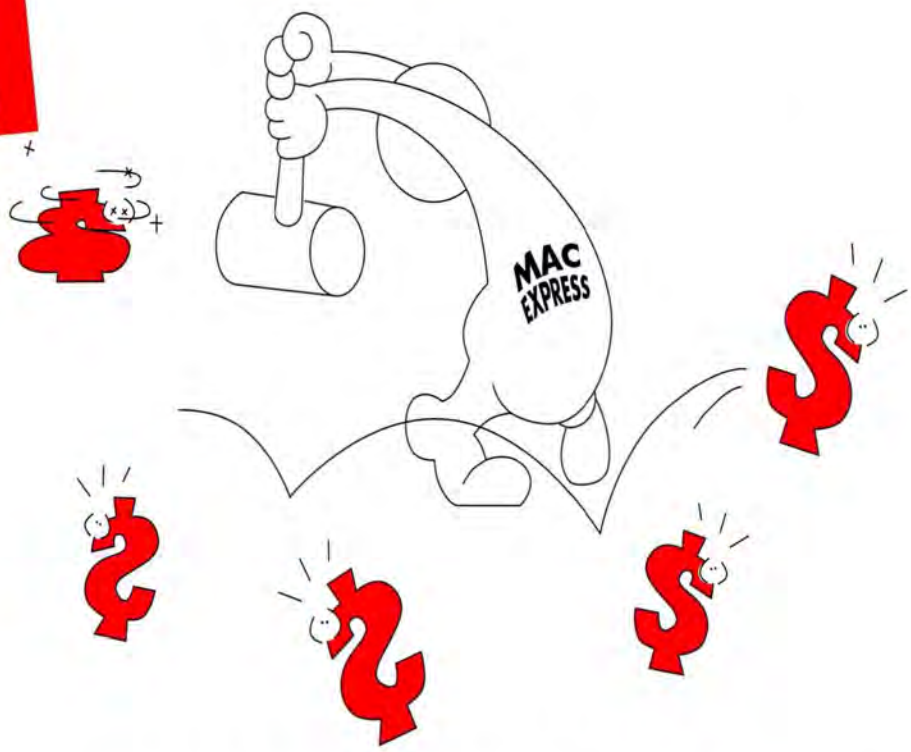
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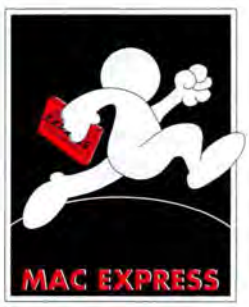
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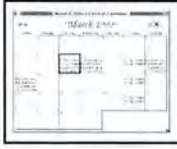
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Source: MacUser 1992 Study of Microcomputer Product Ownership and Buying Plans

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Source: MacUser Mail Order Report, 1991

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1 issue–$460, 3 issues–$440, 6 issues–$430, 12 issues–$415.
Multiple-ad per issue rates also available.
Prepayment must accompany each insertion.
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MacUser will design and typeset each BusinessCard ad. Advertisers should furnish typewritten copy. Ads include: 1) Headline (1 line, initial caps=30 characters max, all caps=25 characters max), 2) Descriptive copy (5 lines, 225 characters max), 3) Company name (same specifications as headline), and 4) Address and telephone number (2 lines, 40 characters per line). No logos, artwork or camera-ready ads. Publisher reserves the right to edit supplied copy to meet section specifications.

DEADLINES:
MacUser is published 12 times a year.
The BusinessCard closing is approximately two months prior to issue date.
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Source: ABC, June 1992

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Source: ABC, June 1992

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This month, bowing to numerous complaints that John C. Dvorak's columns are in dubious taste, utterly without redeeming social value, and — most important — impossible to decipher — MacUser *introduces a more serious and useful new feature: a monthly glossary of computer terms used in the magazine. More useful than the hot air found in Balloon Help,* MacUser*'s new Buffoon Help will make you fluent in geek-speak in no time. For your convenience, each installment is designed to be photocopied and collected in a three-ring binder so you can create your own handy reference guide. If you'd like an attractive Buffoon Help binder in which to collect each monthly installment, send $29.95 (cache or Czech only; no stamps, please) to* MacUser, *Binder Division, 950 Tower Lane, 18th Floor, Foster City, CA 94404, attn: I. M. Gullible.*

Buffoon Help

Compiled by Nhoj S. Karovd

ASCII: A prerequisite before you can receivey.
Adobe Type Manager: a supervisor with a mudlike personality.
A/UX: how to greet your former spouse from way across the street.
baud rate: the scale on which Bo Derrick rated a 10.
BBS: see *character.*
blueprint: the result of sitting nude on a photocopier.
carriage return: what most programmers would do if they worked at a supermarket.
character: an oddball you meet on a BBS.
control characters: middle-management yuppies.
CPU: what you say to alert someone to a nearby skunk.
decompressing: a three-martini lunch.
descender: who da recipient got it from.
dragging: wearing your spouse's bathrobe.
drivers: what most programmers would be if they worked at Domino's Pizza.
DIP: a Windows user.
DIP switch: a programmer who writes for both the Mac and Windows.
dot pitch: dot ball thrown to dot catcher.
EPROM: the portion of ROM that contains the *eep* sound.
External floppy: a flasher.
halftones: a doo-wop group from the '50s.
ID conflict: a bad driver's license picture.
icon: Tina Turner's former partner.
image compression: a Jenny Craig-approved lunch.
interleaving: what you do after interarriving.
line spacing: a form of writer's block experienced by word-processor users.
MIDI: what Mickey calls his girlfriend when he has a cold.
mouse keys: Russian for *mice.*
nanosecond: your less-beloved grandmother.
Norton Utilities: the sewer system on "The Honeymooners."
optimizer: a person who thinks everything is okeydokey.
page flipping: a short-lived fad in the Eisenhower-era Congress.
pixel: Tinkerbell after the hormone shots.
platter: see *halftones.*
pull-down: a risky opening line.
serial port: the loading dock in Battle Creek, Michigan.
SCSI port: Long Beach, California.
smooth talker: a PC salesperson.
sysop: a drunken sibling.
UART: tattoos found on some sheep.
VRAM: an experimental German barnyard animal.
WYSIWYG: a really snazzy WYG.



ILLUSTRATION: ROBERT ZIMMERMAN

Announcing a better mousetrap.

The least you should do for your Mac®:

The NEC MultiSync® 3FGx™ monitor.



MACWORLD MW EDITORS' CHOICE March '92

In 1992, the only monitor to snag the coveted five-mice rating was an NEC monitor: the MultiSync 4FG. After running it and 13 others through the most rigorous technical evaluation they'd ever used for testing monitors, *MacUser* magazine concluded, "If you're looking for the sharpest display, the NEC MultiSync 4FG should be your top choice." What more can we say? Glad you asked.

Our AccuColor™ Control System prompted *MacUser* to make special mention of the "easy color adjustments." AccuColor lets you adjust on-screen colors, so if you're looking for mouse-tail pink, that's what you'll get.

If, however, color control is not a priority for you, you'll be very happy with NEC's MultiSync 3FGx monitor, which shares almost all of the 4FG's award-winning features. Both monitors produce sharp, bright images, crisp graphics and vibrant colors. An Invar shadow mask provides increased brightness without loss of focus.

Another big idea—the display area. The large 15″ screen (13.8″ active display area) coupled with FullScan™ capability for edge-to-edge images gives you a larger display area than typical 13″ or 14″ RGB monitors.

How do you make an NEC MultiSync monitor work with your Mac? Just plug it in, using NEC's free FG/Mac cable adapter. It works with the Mac's on-board video, so you won't need an add-in video board.*

Both monitors are compatible with the Mac® II family, Quadra™ series, LC's, PowerBooks™ and PC systems. So you can use just one monitor for both types of platforms. *MacUser* noted the "powerful and versatile controls make switching from a Mac to a PC a snap."

And to make these monitors as user-friendly as possible, we've included ergonomic features such as a tilt/swivel base and up-front user controls. Plus, our Reduced Magnetic Field™ technology meets the strict Swedish MPR II guidelines for magnetic field emissions.

There are lots of reasons for considering an NEC MultiSync monitor for your Mac—the sharp, bright images, the vibrant colors, the large display area, the flexibility, the compatibility—to name five. And the ⬆⬆⬆⬆⬆ to name five more.

For more information on our award-winning monitors, call 1-800-NEC-INFO (in Canada: 1-800-343-4418). Or for a complete brochure via fax, call NEC FastFacts™ at 1-800-366-0476, request #62234.

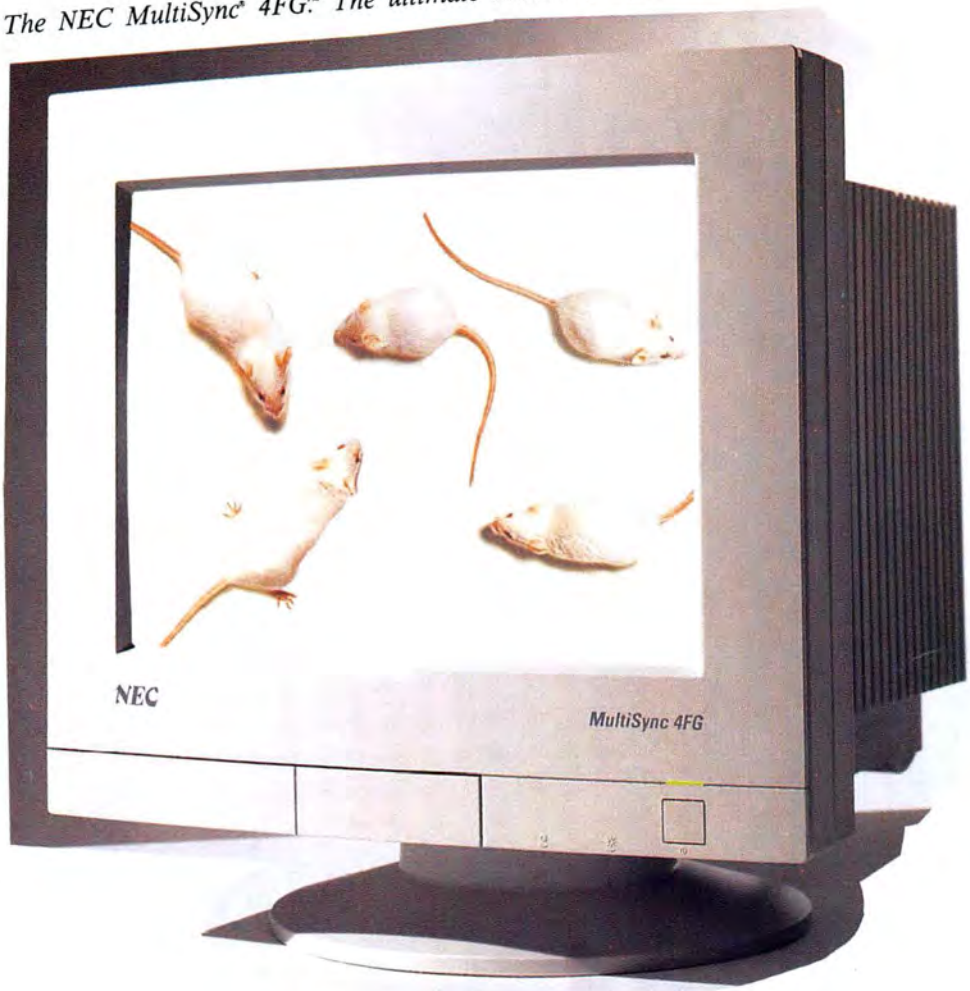
*For Macintosh 640 x 480 resolution, just attach NEC's FG/Mac cable adapter and plug into: Macintosh IIsi, IIci, LC, LCII, IIvx, IIvi, Quadra™ 700, Quadra 900, Quadra 950, Performa™ 400, Performa 600, PowerBook™ 160, PowerBook 180, and the PowerBook 210 and PowerBook 230 with either the DuoDock™ or MiniDock™. Or with an add-in video card: Macintosh II, IIx, IIcx, IIfx, PowerBook 140, PowerBook 145, and PowerBook 170. Get the 640 x 480 FG/Mac adapter free by calling NEC at (312) 622-7427 8:30AM-5PM CST.

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–MacUser Magazine
Aug.'92

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